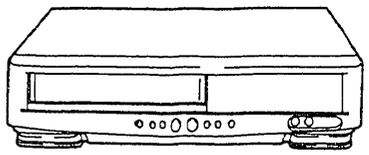
HITACHI

SERVICE MANUAL

TK | No.4338E

VT-M181A
VT-M281A



• Technical Specifications

Recording:	Rotary two-head helical scan azimuth recording
Video:	NTSC color EIA standard
Cassette:	VHS type
Heads:	4 video heads: 2 for SP, 2 for EP. [For VT-M281A] 2video heads for SP and EP [For VT-M181A] 1 full track audio / video erase head 1 combination head for control track, audio erase and audio record / play (3 heads / single housing)
Tape Speed:	33.35 mm / sec (SP, 16.67 mm / sec (LP) (playback only), 11.12 mm / sec (EP)
Tape Width:	12.7 mm
RF Output:	Channel 3 or 4
RF Input:	UHF / VHF 75 ohm
Turning Range:	VHF LOW CH, 2 – 6 (54 MHz – 88 MHz) VHF MID CH, A-5 – A-1 and A-I (90 MHz – 174 MHz) CATV VHF HIGH CH, 7 – 13 (174 MHz – 216 MHz) VHF SUPER CH, J – W (216 MHz – 300 MHz) CATV VHF HYPER CH, W+1 – W+28 (300 MHz – 468 MHz) CATV UHF CH, 14 – 69, W+29 – W+84 (470 MHz – 806 MHz)
Video Input:	1 – 2 Vp-p 75 ohm unbalanced
Video Output:	1 Vp-p 75 ohm unbalanced
Audio Input:	316 mV rms (–7.8 dB) 50 kohm
Audio Output:	316 mV rms (–7.8 dB) 1.5 kohm
Video Recording S / N:	Better than 45 dB (SP), better than 40 dB (EP)
Horizontal Resolution:	240 lines (SP), 220 lines (LP) (playback only), 230 lines (EP)
Audio Response:	50 Hz – 10 kHz (SP), 100 Hz – 6 kHz (EP)
Audio S / N:	Better than 43 dB (SP), better than 40 dB (EP)
Power Input:	AC 120 V 60 Hz
Power Consumption:	24 W nominal
Cabinet Size:	14-15 / 16" (W) x 3-1 / 4" (H) x 12 11 / 16" (D) 38.0 cm (W) x 8.2 cm (H) x 32.3 cm (D)
Weight:	11.7 lbs (5.3 kg)
Accessories:	1 coaxial cable (Part No. 5861141), 1 remote control unit (Part No. 5616491), 2 AA batteries

VHS

This video desk is a VHS type video recorder. For proper operation, only the VHS type cassette must be used.

SPECIFICATIONS AND PARTS ARE SUBJECT TO CHANGE FOR IMPROVEMENT

VIDEO CASSETTE RECORDER

December 1993 TOKAI Consumer Electronics Division

SAFETY PRECAUTIONS

NOTICE: Comply with all cautions and safety related notes located on or inside the cabinet and on the chassis.

1. When replacing a chassis in the instrument, all the protective devices must be put back in place, such as barriers, non-metallic knobs, adjustment and compartment covers/shields, isolation resistors/capacitors, etc.
2. When service is required, observe the original lead-dress. Extra precautions should be taken to assure correct lead dress in the high voltage circuit.
3. Always use the manufacturer's replacement components. Especially critical components as indicated on the circuit diagram should not be replaced by other manufacturer's. Furthermore, where a short-circuit has occurred, replace those components that indicate evidence of overheating.
4. Before returning an instrument to the customer, the service technician must thoroughly test the unit to be certain that it is completely safe to operate without danger of electrical shock, and be sure that no protective device built into the instrument by the manufacturer has become defective or inadvertently defeated during servicing. Therefore, the following checks should be performed for the continued protection of the customer and service technician.

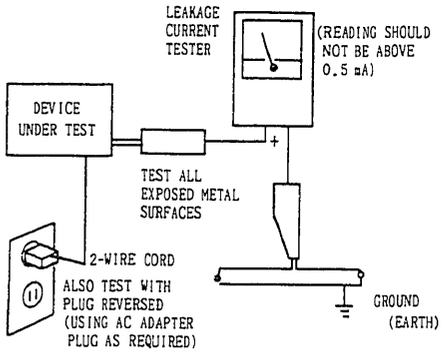
Leakage Current Cold Check

With the AC plug removed from the AC120V, 60Hz source, place a jumper across the two plug prongs. Turn the AC power switch on. Using an insulation tester (DC500V), connect one lead to the jumpered AC plug and touch the other lead to exposed metal parts (antennas, screwheads, metal overlays, control shafts, etc.), particularly any exposed metal part having a return path to the chassis. Exposed metal parts having a return path to the chassis should have a minimum resistor reading of 0.3 Mohm and a maximum resistor reading of 5 Mohm. Any resistor value below or above this range indicates an abnormality which requires corrective action. Exposed metal parts not having a return path to the chassis will indicate an open circuit.

Leakage Current Hot Check

Plug the AC line cord directly into a AC120V, 60Hz outlet (do not use an isolation transformer for this check).

Turn the AC power switch on. Using a "Leakage Current Tester", measure for current from all exposed metal parts of the cabinet (antennas, screwheads, metal overlays, control shaft, etc.), particularly an exposed metal part having a return path to the chassis, to a known ground (earth) (water pipe, conduit, etc.). Any current measured must not exceed 0.5 mA.


LEAKAGE CURRENT TESTER
(READING SHOULD NOT BE ABOVE 0.5 mA)
DEVICE UNDER TEST
TEST ALL EXPOSED METAL SURFACES
2-WIRE CORD
ALSO TEST WITH PLUG REVERSED (USING AC ADAPTER PLUG AS REQUIRED)
GROUND (EARTH)

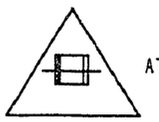
AC Leakage Test

ANY MEASUREMENTS NOT WITHIN THE LIMITS OUTLINED ABOVE ARE INDICATIVE OF A POTENTIAL SHOCK HAZARD AND MUST BE CORRECTED BEFORE RETURNING THE UNIT TO THE CUSTOMER.

PRODUCT SAFETY NOTICE

Many electrical and mechanical parts have special safety-related characteristics. These are often not evident from visual inspection nor can the protection afforded by them necessarily be obtained by using replacement components rated for a higher voltage, wattage, etc. Replacement parts which have these special safety characteristics are identified in this Service Manual. Electrical components having such features are identified by marking with a ⚠ on the schematics and the parts list in this Service Manual. The use of a substitute replacement component which does not have the same safety characteristics as the HITACHI recommended replacement one, shown in the parts list in this Service Manual, may create shock, fire, or other hazards. Product safety is continuously under review and new instructions are issued from time to time. For the latest information, always consult the current HITACHI Service Manual. A subscription to, or additional copies for, HITACHI Service Manual may be obtained at a nominal charge from HITACHI SALES CORPORATION.

CAUTION ON FUSE REPLACEMENT



CAUTION : FOR CONTINUED PROTECTION AGAINST RISK OF FIRE, REPLACE ONLY WITH SAME TYPE, AMPERAGE, VOLT FUSE.

ATTENTION : AFIN D'ASSURER UNE PROTECTION PERMANENTE CONTRE TOUT RISQUE D'AMORÇAGE ÉLECTRIQUE, REMPLACER UNIQUEMENT PAR UN FUSIBLE DE MÊME TYPE ET DE AMPERES VOLTS.

This symbol indicates a Fast Operating Type Fuse.

CONTENTS

CHAPTER 1

COMPARISON WITH PREVIOUS MODEL 1-1
WHEN USING THIS SERVICE REFERENCE MATERIAL ... 1-3
SERVICE MANUAL ABBREVIATION LIST 1-4

CHAPTER 2

DISASSEMBLY

1. NAMES AND LOCATIONS OF CIRCUIT BOARDS ... 2-1
2. CASE REMOVAL 2-1
   1. Top Cover 2-1
   2. Bottom Cover 2-1
   3. Front Panel 2-2
   4. Cassette Door 2-2
   5. Rear Panel 2-2
3. CIRCUIT BOARD REMOVAL 2-2
   1. Function SW and Front Jack Circuit Boards 2-2
   2. Main Circuit Board 2-3
   3. Luminance/Chroma, Servo and Audio Circuit Boards 2-3
   4. Power Supply Circuit Board 2-3
   5. Pre-Amp/Head SW Circuit Board 2-3
   6. Sensor Ciucuit Board 2-3
4. IDENTIFICATIONS AND MAIN MECHANICAL COMPONENTS 2-4
5. CASSETTE LOADING MECHANISM REMOVAL 2-6
   1. Cassette Loading Mechanism 2-6
   2. Side Gear Bracket, Chassis Holder, FL Drive Arm, Cassette Holder Assembly and Front Holder 2-6
   3. Gear Bracket, Door Arm, FL Gears (A),(B) and Switch Arm 2-6
6. MAIN MECHANICAL COMPONENTS REMOVAL 2-7
   1. FE (Full Erase) Head 2-7
   2. A/C (Audio/Control) Head 2-7
   3. Upper Cylinder (Video Heads) and Head Cleanig Bracket Assembly 2-7
   4. Cylinder Motor Assembly 2-8
   5. Capstan Motor Assembly 2-8
   6. Tension Band/Tension Arm/ Tension Drive Arm 2-8
   7. Safety Arm 2-9
   8. Upper Plate, Torque Change Arm, Supply/Take-up Main Brakes 2-9
   9. Supply/Take-up Reel Disks, Supply/Take-up Sub Brakes 2-9
   10. Pressure Roller Assembly 2-9
   11. Pressure Roller Cam Gear, Cassette Lid Opener and Middle Pole 2-9
   12. Pressure Roller Drive Gear 2-10
   13. Pressure Roller Drive Arm and Fine Slow Brake Arm 2-10
   14. Supply/Take-up Guide Rollers 2-11
   15. Cylinder Motor Base 2-11
   16. Centre Pulley, FL Relay Gear (B) 2-11
   17. Reel Drive Idler, Reel Gears-(L)/(R) 2-11
   18. Roller Plate, Mode Gear 2-12
   19. Gear Plate, Relay Gear, Wheel Gear, Take-up Brake Sub Arm, Latch Arm, Relay Gear-(C), Cam Gears (A)/(B) ... 2-12
   20. Loading Motor Assembly 2-13
   21. FL Relay Gear-(A), FL Change Arm, FL Change Gear 2-13
   22. Supply/Take-up Loading Arms 2-14
   23. Torque Arm Installation Procedure ... 2-14

CHAPTER 3

MECHANISM ADJUSTMENT

JIGS AND TAPES FOR ADJUSTMENT 3-1
ADJUSTMENT PARTS LOCATIONS 3-1

MECHANICAL PARTS ADJUSTMENT 3-2
1. Mechanism State Switch Adjustment 3-2

TAPE TRANSPORT SYSTEM PARTS ADJUSTMENT 3-3
1. Reel Disk Height Adjustment 3-3
2. Tension Pole Position and Tention Adjustment 3-4
3. Guide Roller Height Adjustment 3-5
4. Audio/Control (A/C) Head Adjustment ... 3-7
5. X-Value Adjustment (for VT-M281A) 3-8
6. X-Value Adjustment (for VT-M181A) 3-9
7. Adjustment After Replacing Cylinder (Video Heads) 3-10
8. Tension/Torque Checks 3-11
9. To Set the VCR to the Loading State without Inserting a Cassette ... 3-12

MAINTENACE/INSPECTION PROCEDURE 3-13
1. Required Maintenance 3-13
2. Scheduled Maintenance 3-13
3. Check before Starting Repairs 3-13
4. Tools Needed for Inspection and Maintenance 3-13
5. Maintenance Procedures 3-13
6. Inspection Locations 3-14
7. Parts to be Maintained/Inspected and Maintenance/Inspection Schedules 3-15

CHAPTER 4

ELECTRIC CIRCUIT ADJUSTMENT

TEST EQUIPMENT AND TAPES NECESSARY FOR ADJUSTMENT 4-1
CAUTIONS ON ADJUSTMENTS 4-1
SERVICING POSITIONS 4-1
USABLE SERVICING METHODS 4-1
ADJUSTMENT PARTS LOCATION 4-2

1. SERVO CIRCUIT ADJUSTMENTS
   1. Head Switching Point Adjustment 4-3
   2. Vertical Jitter Correction 4-3
   3. Slow Tracking Preset Adjustment (For VT-M281A) 4-3
2. VIDEO CRICUIT ADJUSTMENT
   1. E-E Level Adjustment 4-4
   2. White Clip Level Adjustment 4-4
   3. FM Carrier and Deviation Adjustment .. 4-4
   4. Playback Level Adjustment 4-5
   5. Record Chroma Level Adjustment 4-5
3. AUDIO CIRCUIT ADJUSTMENT
   1. Audio Bias Level Adjustment 4-5

CHAPTER 5

SCHEMATIC AND CIRCUIT BOARD DIAGRAMS

	SCHEMATIC DIAGRAM	CIRCUIT BOARD DIAGRAM
INTERNAL WIRING DIAGRAM	5-1	
LUMINANCE/CHROMA	5-3	5-29
SENSOR	5-6	5-34
CYL.MOTOR	5-8	-
CAPSTAN MOTOR	5-8	-
SERVO	5-9	5-27
REAR JACK(VT-M181A)	5-11	5-27
REAR JACK(VT-M281A)	5-13	5-27
SYS.CON./TIMER	5-15	5-27
CHARACTER GENERATOR	5-17	5-27
AUDIO	5-18	5-30
PRE AMP/HEAD SW (VT-M281A)	5-19	5-30
PRE AMP/HEAD SW (VT-M181A)	5-21	5-29
FUNCTION SW	5-22	5-33
FRONT JACK	5-22	5-33
JACK	5-22	5-33
POWER SUPPLY	5-23	5-33
TUNER/IF/RF CONVERTER	5-24	-
REMOTE CONTROL	5-25	-

WAVEFORMS
- LUMINANCE/CHROMA 5-5
- SERVO 5-7

CHAPTER 6

EXPLODED VIEWS

- CABINET SECTION 6-1
- CHASSIS SECTION 6-2
- CASSETTE LOADING MECHANISM SECTION 6-4

CHAPTER 7

REPLACEMENT PARTS LIST

- MECHANICAL PARTS LIST 7-1
- ELECTRICAL PARTS LIST 7-2

CHAPTER 8

APPENDIX

1. BLOCK DIAGRAM
   - 1-1. OVERALL 8-1
   - 1-2. POWER SUPPLY 8-3
   - 1-3. VIDEO 8-5
   - 1-4. AUDIO 8-7
   - 1-5. SYSTEM CONTROL 8-9
   - 1-6. SERVO 8-11
2. MICROPROCESSOR PIN FUNCTION TABLE
   - SYSTEM CONTROL μP(IC701)
   - PIN FUNCTIONS 8-13
3. OPERATION
   - Remote Control Buttons 8-16
   - When the Remote Doesn't Work Right 8-16
   - VCR Controls 8-17
   - Display Indicators 8-17
   - Meet Your On-Screen Guide 8-17
   - Setup for First-Time Operation 8-18
   - Setup Options 8-18
   - Setting the Clock 8-19
   - More About Channel Selections 8-19
   - About Videocassette Tapes 8-20
   - Types 8-20
   - Safety Tabs Prevent Erasure 8-20
   - Advanced Operations 8-20
   - Controlling Your TV with the VCR's Remote 8-20
   - Hooking Up to a Cable Box 8-21
   - Remote Control of the Cable Converter ... 8-23
   - Often Encountered Problems 8-23

CHAPTER 1

COMPARISON WITH PREVIOUS MODEL

	ITEM	VT-M181A	VT-M170A/M171A/M171AW
FEATURES	REC /PLAY SYSTEM	VHS	VHS
	NUMBER OF CHANNELS	181 CH	181 CH
	CHANNEL PRESET	F.S AUTO TUNING	F.S AUTO TUNING
	TIMER REC PROGRAM	8 PROGRAMS / 1 YEAR	8 PROGRAMS / 1 YEAR
	TIMER BACK-UP	ABOUT 1 MIN.	ABOUT 5 SEC.
	MODE DISPLAY	OSD / FL DISPLAY	OSD / FL DISPLAY
	TIMER PROGRAMMING	OSD (BY REMOTE CONTROL)	OSD (BY REMOTE CONTROL)
	CHANNEL TUNING	OSD (BY REMOTE CONTROL)	OSD (BY REMOTE CONTROL)
	CLOCK SETTING	OSD (BY REMOTE CONTROL)	OSD (BY REMOTE CONTROL)
	OSD LANGUAGE	3 LANGUAGE (GRAPHIC)	3 LANGUAGE (NORMAL)
	COUNTER DISPLAY	OSD/FL DISPLAY	OSD/FL DISPLAY
	SCANAPLAY INDEX	YES	YES
	COUNTER GO-TO	YES	YES
	AUTO TRACKING	YES	YES
	LINE/TUNER SELECTOR	YES (BY REMOTE CONTROL)	YES (BY REMOTE CONTROL)
	PROBLEM GUIDE	NO	YES
	FRONT A/V INPUT	YES	YES (VT-M171A)
	HIGH SPEED REWIND (2.5 min.)	YES	YES
	MOVIE RETURN	YES	YES
CHASSIS	BASIC CHASSIS TYPE	ACE MECHANISM	ACE MECHANISM
	LOADING MECHANISM	FULL LOADING	FULL LOADING
	HEADS ON CYLINDER	2HEADS (SP,LP,EP:30μm)	2HEADS (SP,LP,EP:30μm)
	HEAD CLEANING MECHANISM	PROVIDED	PROVIDED (VT-M171AW)
MAIN CONTROL ICs	VIDEO CIRCUIT		
	LUMINANCE / CHROMA PROCESS	HA118370NT (IC201)	HA11817ONT (IC201)
	CCD 1H DELAY	CXL5507P (IC203)	CXL5507P (IC202)
	AUDIO CIRCUIT		
	LINEAR AUDIO PROCESS	LA7297 (IC401)	LA7297 (IC401)
	SERVO CIRCUIT		
	SERVO CONTROL	HD49781NT (IC601)	HD49781NT (IC601)
	FG AMP	NJM4558D (IC602)	NJM4558D (IC602)
	TIMER / SYSTEM CONTROL CIRCUIT		
	TIMER/SYSTEM CONTROL μP	M38184M8-225FP (IC701)	M38184M8-123FP (IC701)
	LOADING MOTOR DRIVE	BA6209U4 (IC702)	BA6209U4 (IC702)
	RESET	PST600G (IC703)	PST600G (IC703)
	OSD CIRCUIT		
	CHARACTER GENERATOR	M35010-085SP (IC1401)	M35010-012SP (IC1401)
	PLL H.SYNC GEN.	BA7046A (IC1441)	BA7046A (IC1441)
	POWER SUPPLY CIRCUIT		
	5.6V REGULATOR	M5F7805L (IC864)	M5F7805L (IC864)

COMPARISON WITH PREVIOUS MODEL

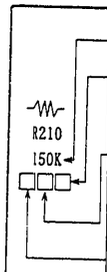
	ITEM	VT-M281A	VT-M265A/M270A/M272A
FEATURES	REC /PLAY SYSTEM	VHS	VHS
	NUMBER OF CHANNELS	181 CH	181 CH
	CHANNEL PRESET	F.S AUTO TUNING	F.S AUTO TUNING
	TIMER REC PROGRAM	8 PROGRAMS / 1 YEAR	8 PROGRAMS / 1 YEAR
	TIMER BACK-UP	ABOUT 1 MIN.	ABOUT 5 SEC. (VT-M270A/M265A) ABOUT 30 MIN. (VT-M272A)
	MODE DISPLAY	OSD / FL DISPLAY	OSD / FL DISPLAY
	TIMER PROGRAMMING	OSD (BY REMOTE CONTROL)	OSD (BY REMOTE CONTROL)
	CHANNEL TUNING	OSD (BY REMOTE CONTROL)	OSD (BY REMOTE CONTROL)
	CLOCK SETTING	OSD (BY REMOTE CONTROL)	OSD (BY REMOTE CONTROL)
	OSD LANGUAGE	3 LANGUAGE (GRAPHIC)	3 LANGUAGE (NORMAL)
	COUNTER DISPLAY	OSD/FL DISPLAY	OSD/FL DISPLAY
	SCANAPLAY INDEX	YES	YES
	COUNTER GO-TO	YES	YES
	AUTO TRACKING	YES	YES
	LINE/TUNER SELECTOR	YES (BY REMOTE CONTROL)	YES (BY REMOTE CONTROL)
	PROBLEM GUIDE	NO	YES
	FRONT A/V INPUT	YES	YES (VT-M270A/272A)
	HIGH SPEED REWIND (2.5 min.)	YES	YES
	MOVIE RETURN	YES	YES
	VCR PLUS +	NO	YES (VT-M272A)
CHASSIS	BASIC CHASSIS TYPE	ACE MECHANISM	ACE MECHANISM
	LOADING MECHANISM	FULL LOADING	FULL LOADING
	HEADS ON CYLINDER	DA4 HEADS	DA4 HEADS
	HEAD CLEANING MECHANISM	PROVIDED	PROVIDED (VT-M272A)
MAIN CONTROL ICs	VIDEO CIRCUIT		
	LUMINANCE / CHROMA PROCESS	HA118370NT (IC201)	HA11817ONT (IC201)
	CCD 1H DELAY	CXL5507P (IC203)	CXL5507P (IC203)
	AUDIO CIRCUIT		
	LINEAR AUDIO PROCESS	LA7297 (IC401)	LA7297 (IC401)
	SERVO CIRCUIT		
	SERVO CONTROL	HD49781NT (IC601)	HD49781NT (IC601)
	TIMER / SYSTEM CONTROL CIRCUIT		
	TIMER/SYSTEM CONTROL μP	M38184M8-225FP (IC701)	M38184M8-123FP (IC701) [For VT-M265A/M270A] M38184MA-056FP [For VT-M272A]
	LOADING MOTOR DRIVE	BA6209U4 (IC702)	BA6209U4 (IC702)
	RESET	PST600G (IC703)	PST600G (IC703)
	OSD CIRCUIT		
	CHARACTER GENERATOR	M35010-085SP (IC1401)	M35010-012SP (IC1401) [For VT-M265A/M270A] M35010-085SP [For VT-M272A]
	PLL H.SYNC GEN	BA7046A (IC1441)	BA7046A (IC1441)
	POWER SUPPLY CIRCUIT		
	5.6V REGULATOR	M5F7805L (IC864)	M5F7805L (IC864)

WHEN USING THIS SERVICE REFERENCE MATERIAL

1. How to Read Abbreviations

Values, dielectric resistances (power capacitances), tolerances, grades of resistors (excluding variable resistors, etc.) and capacitors are indicated in the schematic diagrams using abbreviations. Collate these abbreviations and the following tables to read abbreviations and replace parts correctly.

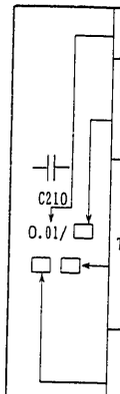
[RESISTORS]



Value	No indication ····· ohm K ····· kohm
Tolerance	No indication ····· ± 5% K ····· ±10% M ····· ±20%
Power capacitance	No indication ····· 1/8W (All capacitances other than 1/8W are indicated in schematic diagrams with W omitted.)
Type	No indication ·· Carbon film fixed RC ····· Carbon solid RW ····· Power-type wire wound solid RS ····· Metal oxide film solid RN ····· Metal film solid

Example
R210
150K ····· 150 kohm, carbon solid
RC.1/2.K 1/2W, ±10%

[CAPACITORS]



Value	No indication ····· μF P ····· PF
Dielectric resistance	No indication ····· 50WV (All resistances other than 50WV and those of electrolytic capacitors are indicated with WV omitted.)
Tolerances	No indication ····· ±10% J ····· ± 5% M ····· ±20% C ····· ±0.25PF Z ····· +80%-20% (No indication for electrolytic capacitors. (excluding tantalum and high stability electrolytic capacitors.)
Type	No indication ··· Ceramic, general electrolytic (see circuit symbol to distinguish from ceramic.) MYL ····· Mylar (Polyester film) STY ····· Styrol TA ····· Tantalum KU ····· High stability electrolytic MP ····· Metallized paper

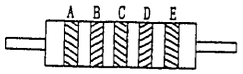
Example
C210
0.01/25 ····· Mylar, 0.01μF, 25WV
MYL.J ±5%

2. Markings in Schematic and Circuit Board Diagrams

(1) Parts with marks "■" attached to circuit numbers in the schematic and circuit board diagrams are discrete components.
(2) Parts with marks "●" attached to circuit numbers in the schematic and circuit board diagrams are chip components.
(3) Parts with marks ⓩ in the circuit board diagrams are leadless jumpers.

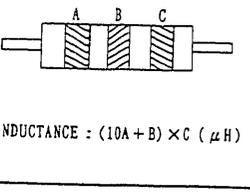
3. How to Read Capacitance of Resistance-Type Capacitors and Coils

[CAPACITOR]



CAPACITY : (10A+B)×C (PF)
TOLERANCE : D
RATED VOLTAGE : BODY COLOR
PINK : 25V
GREEN : 50V
CHARACTERISTICS : E

[COIL]



INDUCTANCE : (10A+B)×C (μH)

COLOR	A, B	C	D	E
Black	0	10^0	±20%	For temperature compensation
Brown	1	10^1		
Red	2	10^2		
Orange	3	10^3		
Yellow	4	10^4		
Green	5	10^5		
Blue	6			
Violet	7			
Gray	8		±30%	High dielectric constant type
White	9			For temperature compensation
Gold		10^{-1}	± 5%	
Silver		10^{-2}	±10%	High dielectric constant type

4. Cautions on Use of MOS ICs

(1) MOS ICs are inserted in black foam for shipment. This foam is a conductor which short-circuits between the leads to prevent damage. Do not remove ICs from this foam during storage. Avoid removing ICs from this foam, placing them on plastic which is likely to be charged with static electricity or inserting them into styrol foam.
(2) High voltages may be applied during soldering caused by leakages from the soldering iron. Be sure to ground the tip of the soldering iron or use a low voltage soldering iron.
(3) The human body and clothes made of synthetic fiber or nylon gloves may be charged with several thousand volts of static electricity because of friction. Workers should be grounded.

SERVICE MANUAL ABBREVIATION LIST

A	
ACC	Automatic Color Control
ACK	Automatic Color Killer
ADC B-Y	Analog to Digital Converted B-Y Signal
ADC R-Y	Analog to Digital Converted R-Y Signal
ADC Y	Analog to Digital Converted Luminance
ADD	Adder
ADRS	Address
A.DUB	Audio Dubbing
AF	Autofocus
AFC	Automatic Frequency Control
AGC	Automatic Gain Control
AGC KILLER	AGC Killer Voltage
ALC	Automatic Level Control
AIC	Automatic Iris Control
AM	Amplitude Modulation
AMP	Amplifier
APC	Automatic Phase Control
ASBL	Assemble (Phase Matching)
AUD.	Audio
AUX	Auxiliary
A5V	Always 5V B+ Source
B	
B (BLU)	Color Signal BLUE
BATT.	Battery
BF	Burst Flag
BG	Burst Gate or Back Ground
BGP	Burst Gate Pulse
BH	Power Supply for Selecting VHF High Band
BL	Power Supply for Selecting VHF Low Band
BLK	Blanking
BM	Power Supply for Selecting VHF Mid Band
BPF	Bandpass Filter
BS	Power Supply for Selecting VHF Super Band
BU	Power Supply for Selecting UHF Band
BU	Back-up
BUF.	Buffer Amplifier
B-YL	Battery
C	
C	Chroma
C (CHROMA)	Chrominance Signal
CAPST.	Capstan
CAS	Column Address Strobe
CARRI.	Carrier
CATV	Cable TV
C.BLANK	Chroma Blanking
C.BLK	Composite Blanking
CCD	Charge Coupled Device
CG	Character Generator
C.FG/CFG	Capstan Frequency Generater
C.FREE RUN	Chapstan Free Run
CH	Channel
CHD	Camera Horizontal Drive Pulse
CHAR.	Character
CHROMA	Chrominance
C.MEMORY	Counter Memory
CNR	Chroma Noise Reducer
COM.	Common
COM.	Composite
COMPA	Comparator
COMPE	Compensator
COMPO	Composite
COMP-EXP	Compressor-Expander
CONV.	Converter
CONT	Control
CORR.	Correlation
COUNT.	Counter
CP	Clamp Pulse
C.PAUSE	Camera Pause
C/R	Capacitor/Resistor
C.RESET	Counter Reset
C.REVERSE	Count Reverse
CST	Cassette

C	
C.SYNC	Composite Synchronizing Signal
CTL	Control Track Pulse (Control)
CYL	Cylinder
CY (CYAN)	Color Signal CYAN
D	
DA	Double Azimuth
D/A	Digital to Analog Converter
D-D	Direct Drive
DEEMPHA.	Deemphasis
DEF	Deflection
DEMOD.	Demodulator
DEMPX	Demultiplexer
DET	Detector
DIFF. AMP	Differential Amplifier
DISCRI.	Discriminator
DISP.	Display
DL	Delay Line
DN	Down
DO	Dropout
DOC	Dropout Compensator
DRAM	Dynamic Random Access Memory
D.REF 25/30	Delayed Reference 25/30Hz
D.SW 25/30	Delayed Switching 25/30Hz
DSP	Digital Signal Processor
DT/OE	Data Transfer/Output Enable
D/W	Dark/White
DWC	Delayed Write Clock
E	
EA-ROM	Electrically Alterable Read Only Memory
E-E	Electronic-to-Electronic
EMPHA.	Emphasis
EQ	Equalizer
EVF	Electronic Viewfinder
EXT.	External
F	
F.ADV	Frame Advance
F/V	Frequency-to-Voltage Converter
FB	Feed Back
FF	Flip Flop
F.FWD	Fast Forward
FG	Frequency Generator
FM	Frequency Modulation
FREQ.	Frequency
FRAME ADV	Frame Advance
Fsc	Color Sub Carrier Frequency
FWD	Forward
G	
GEN	Generator
GND	Ground
H	
H	Horizontal
HBF	Horizontal Burst Flag
HD	Horizontal Drive
Hi-Fi	High Fidelity
HLT	Halt
HPF	High-pass Filter
HPL	High-pass Limiter
HSS	Horizontal Sync. Separator
I	
IF	Intermediate Frequency
INC	Row Counter Increment
INDI.	Indicator
INT.	Internal
INV.	Inverter
I/O	In/Out (Input/Output)
IR	Infrared Rays
IRIS DET	Iris Detection
IRT	Instant Recording Timer
L	
LCD	Liquid Crystal Display
LIN.	Linear
LM	Loading Motor

L	
LNC	Line Noise Canceller
LOG	Logarithm
LP	Long Play
LP (H)	Long Play Signal (Active High)
LPF	Low-pass Filter
LUMA	Luminance
L/R	Left/Right
M	
MAN	Manual
M.BRAKE	Main Brake
M.CUT	Monitor Cut
MEM.	Memory
MEM ON	Memory ON
MEM SW	Memory Switch
MEM VIDEO	Memorized Video
MIX	Mixer
MMV	Monostable Multivibrator
MOD.	Modulator
MPX	Multiplex
MPX VIDEO	Multiplexed Video
M.STATE	Mechanism State
M.STOP	Memory Stop
MTS	Multi Channel Television Sound
N	
NEG	Negative
NFB	Negative Feed Back
NORM. or NOR.	Normal
NR	Noise Reduction
O	
OB	Optical Black
O/E	Odd/Even Field
OSC	Oscillator
OSD	On-Screen Display
P	
PB/PLAY	Playback
P.CONT	Power Control
PIF	Picture Intermediate Frequency
PG	Pulse Generator
P IN P	Picture in Picture
PIX MOVE	Picture Move
PLL	Phase Locked Loop
POS.	Positive
POWER CONT.	Power Control
PROG.	Program
PROTECT.	Protector
PWM	Pulse Width Modulation
R	
R (RED)	Color Signal RED
RAM	Random Access Memory
RAS	Row Address Strobe
RC	Reading Clock
RCC	Reading Clock Clear
RCR	Row Counter Reset
REC	Record
RECT.	Rectifier
REF	Reference
REF 25/30	Reference 25/30Hz from servo circuit
REG	Regulator
REL	Refresh Control
REW	Rewind
REV	Reverse
RF	Radio Frequency
RM	Reel Motor
ROM	Read Only Memory
R-YL	Color Difference Signal R-YL
S	
SAP	Second Audio Program
SAW	Sawtooth
SC	Serial Control
SC1 (0°)	3.58MHz Subcarrier Signal 1 (0-degree Phase Shifted)

S	
SC2 (90°)	3.58MHz Subcarrier Signal 2 (90-degree Phase Shifted)
SEP.	Separator
SG	Signal Generator
S/H	Sample and Hold
SIF	Sound Intermediate Frequency
SOL	Solenoid
SP	Standard Play
SP/LP	Standard Play/Long Play
S.REEL	Supply Reel Sensor
SRCH	Search
SRV	Servo
STABI.	Stabilizer
S.TRACK	Slow Tracking
STBY	Standby Mode
S-VHS	Super VHS
SW 15Hz	15Hz Head Switching Pulse
SW 25/30Hz	25/30Hz Head Switching Pulse
SYNC	Synchronizing signal
SYS.CON	System Control
T	
T (TELE)	Telephoto Angle
T.BRAKE	Take-up Brake
T/L	Tuner/Line
TP	Test Point
T.REEL	Take-up Reel Sensor
T.RESET	Timer Reset
TRS	Transfer
TμP	Timer Microprocessor
TU-μP	Tuning Microprocessor
U	
U/D	Up/Down
UNI.	Unified
V	
V (VERT)	Vertical
VAR	Variable
V.AGC	AGC Voltage
VCA	Voltage Controlled Amplitier
VCO	Voltage Controlled Oscillator
V.DRV	Vertical Drive Pulse
V.DUB	Video Dubbing
V/F	Voltage to Frequency Converter
VHS	Video Home System
VF	Focus Voltage
VOL.	Volume
V-REF	Voltage Reference
VP	Vertical Pulse
VSS	Vertical Sync. Separator
Vss	Voltage Super Source
VT	Tuning Voltage
VT-U	Tuning Voltage-UHF
VT-V	Tuning Voltage-VHF
VCXO	Voltage Controlled Crystal Oscillator
W	
WC	Write Clock
WCC	Write Clock Clear
WE	Weighting
WHT	Color Signal WHITE
WIDE	Wide Angle
WHD	Wide Horizontal Drive
WHT BAL CONT.	White Balance Control
Y	
Y	Luminance Signal
Y/C	Luminance/Chrominance
YE (YEL)	Color Singal YELLOW
YL	Luminance Signal (Low Component)
ANOTHER	
μP	Microprocessor
5V	ON 5V B+ Source
9V	ON 9V B+ Source

CHAPTER 2

DISASSEMBLY

1. NAMES AND LOCATIONS OF CIRCUIT BOARDS

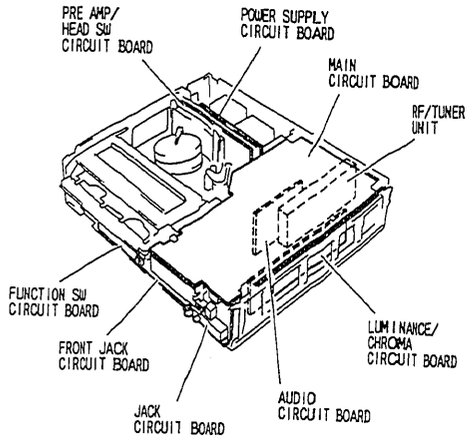


Fig. 1-1 Top View

(Procedure when removing)
Remove the components in the order of letters (A, B, C ···) in the illustrations.
(Procedure when reinstalling)
Reinstall the components by the reverse procedure to removal when not otherwise specified.

2. CASE REMOVAL

1. Top Cover

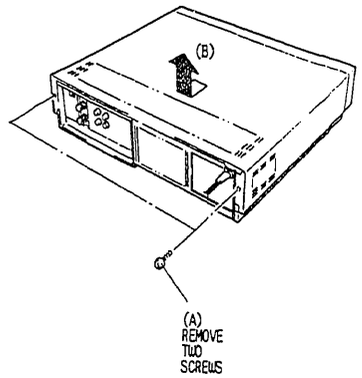


Fig. 2-1

2. Bottom Cover

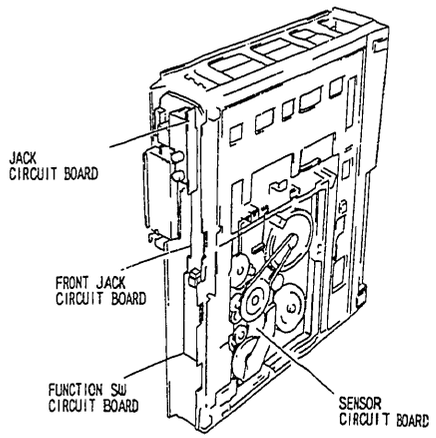


Fig. 1-2 Bottom View

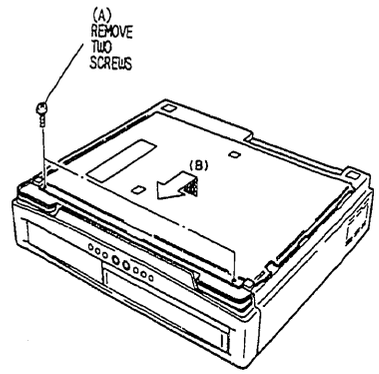


Fig. 2-2

3. Front Panel

◆ Components to remove first
1) Top Cover (Item 2-1)
2) Bottom Cover (Item 2-2)

◆ Caution when reinstalling
- Reinstall the front panel while the cassette door is pushed in halfway so that the boss of door actuating arm can be positively engaged with the recess on the side of the door as shown below.

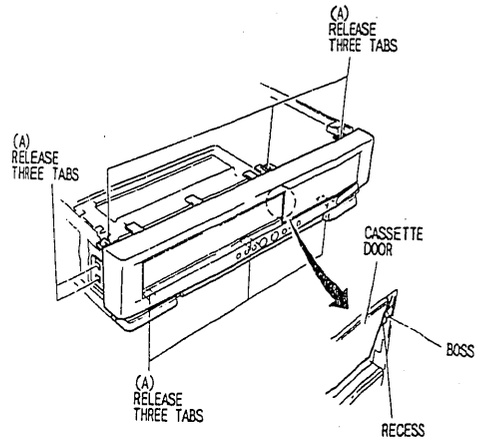


Fig. 2-3

4. Cassette Door

◆ Components to remove first
1) Front Panel (Item 2-3)

◆ Caution when reinstalling
- Attach the spring at the right of the cassette door firmly.

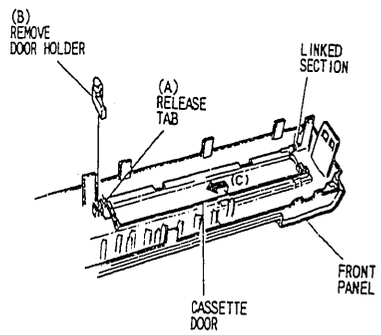


Fig. 2-4

5. Rear Panel

◆ Components to remove first
1) Main circuit board (Item 3-3)

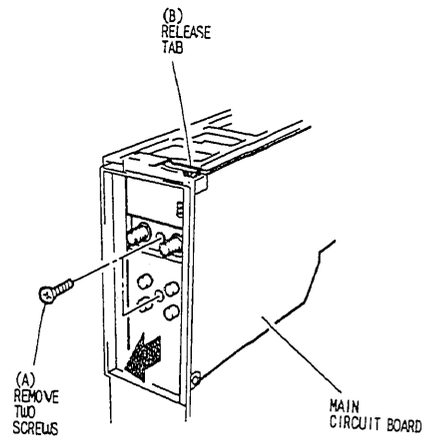


Fig. 2-5

3. CIRCUIT BOARD REMOVAL

1. Function SW and Front Jack Circuit Boards

◆ Components to remove first
1) Front Panel (Item 2-3)

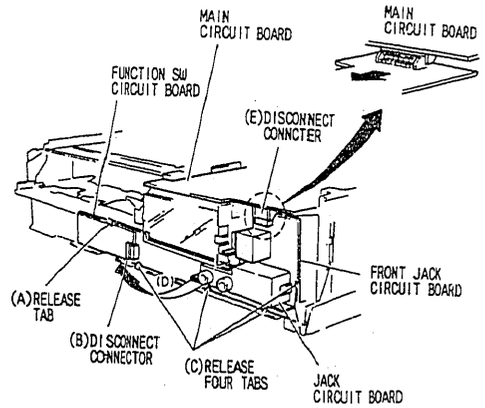


Fig. 3-1

2. Main Circuit Board
◆ Components to remove first
1) Function SW and Front Jack circuit boards (Item 3-1)

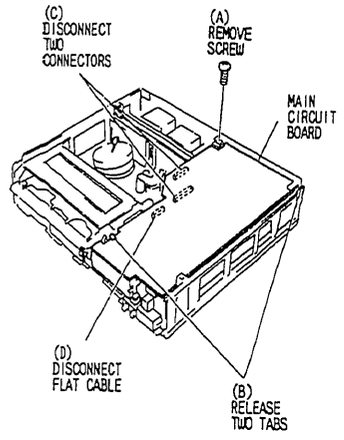


Fig. 3-2

3. Luminance/Chroma, Servo and Audio Circuit Boards
◆ Components to remove first
1) Main circuit board (Item 3-2)

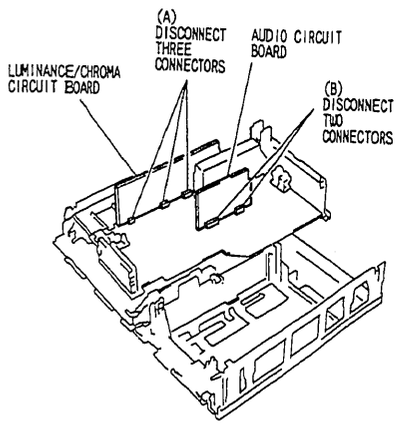


Fig. 3-3

4. Power Supply Circuit Board
5. Pre-Amp/Head SW Circuit Board

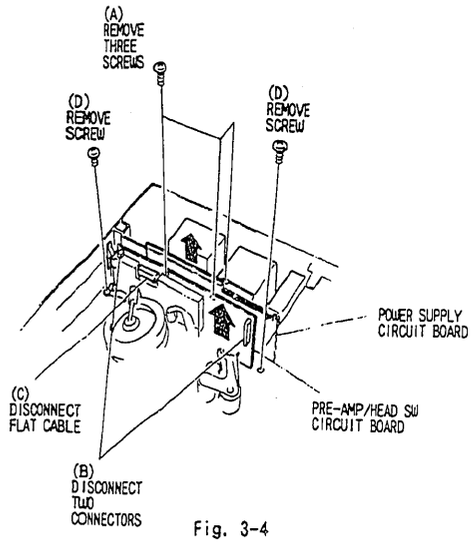


Fig. 3-4

6. Sensor Circuit Board
◆ Components to remove first
1) Centre Pulley/FL Relay Gear (B) (Item 6-16)
2) Roller Plate/Mode Gear (Item 6-18)

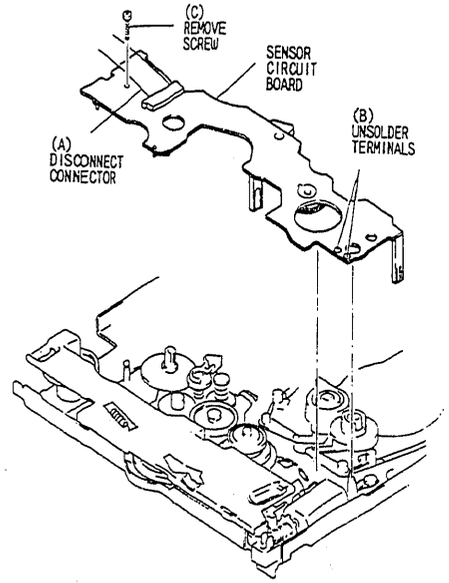
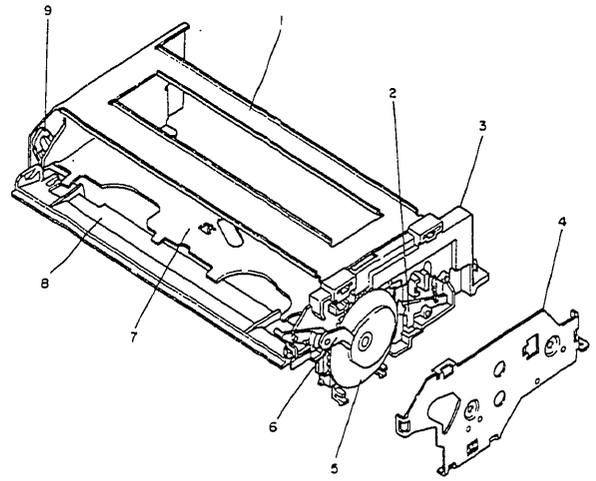


Fig. 3-5

4. IDENTIFICATIONS AND LOCATIONS OF MAIN MECHANICAL COMPONENTS



1. Chassis Holder
2. Switch Arm
3. Side Chassis
4. Gear Bracket
5. FL Gear
6. Door Arm
7. Cassette Holder
8. Front Holder
9. FL Drive Arm

Fig. 4-1 Cassette Loading Mechanism

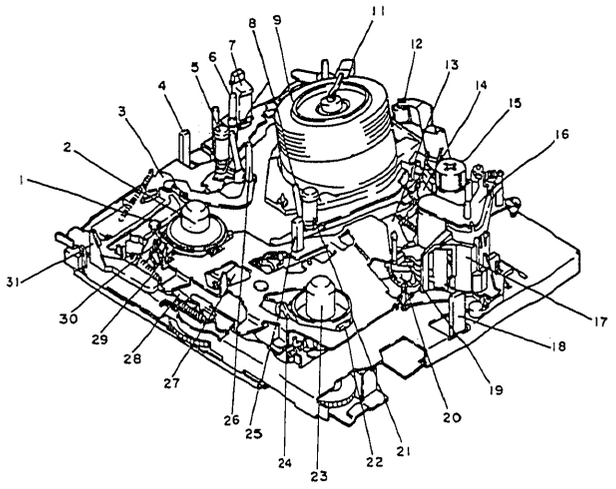


Fig. 4-2 Top View of Mechanism

1. Tension Drive Arm
2. Supply Reel Disk
3. Tension Arm
4. Supply End Sensor
5. Supply Guide Roller
6. Supply Guide Pole
7. Full Erase (FE) Head
8. Inclined Guides
9. Cylinder Motor Assembly
10. ———
11. Static Discharge Brush
12. Head Cleaning Arm Assembly
13. Fine Slow Brake Arm
14. Audio/Control (A/C) Head
15. Capstan Shaft Holder
16. Pressure Roller Assembly
17. Cassette Lid Opener
18. Take-up End Sensor
19. Middle Pole
20. Pressure Roller Drive Gear
21. Take-up Guide Roller
22. Take-up Sub Brake
23. Take-up Reel Disk
24. Take-up Main Brake
25. End LED
26. Tension Pole
27. Torque Change Arm
28. Supply Main Brake
29. Supply Sub Brake
30. Tension Band Assembly
31. Safety Arm

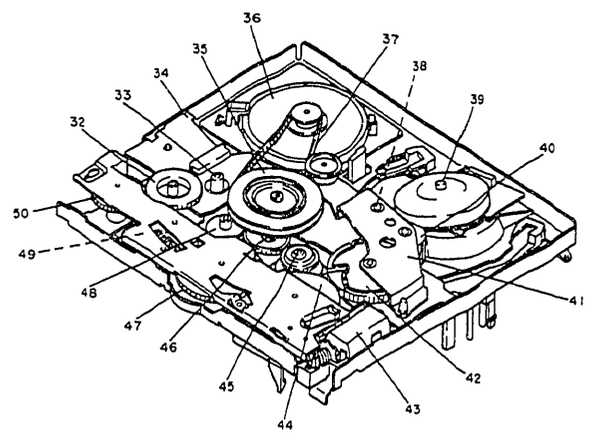


Fig. 4-3 Bottom View of Mechanism

32. FL Relay Gear (B)
33. FL Relay Gear (A)
34. Sensor Circuit Board
35. Centre Pulley
36. Capstan Motor Assembly
37. Drive Belt
38. Take-up Loading Gear
39. Cylinder Motor Assembly
40. Supply Loading Gear
41. Roller Plate
42. Mode Gear
43. Loading Motor
44. Cam Gear (A)
45. Reel Gear (L)
46. Reel Drive Idler
47. Cam Gear (B)
48. Reel Gear (R)
49. Latch Arm
50. FL Relay Gear (C)

Be sure to remove cases, etc. before servicing the mechanism and replacing components, otherwise, the cases, etc. could be damaged.
(Procedure of disassembly)
Remove the parts in the order of letters (A,B,C ···) shown in the illustrations.
(Procedure of reinstallation)
Reinstall the parts by the reverse procedure to removal when no special cautions are given.

5. CASSETTE LOADING MECHANISM REMOVAL

1. Cassette Loading Mechanism

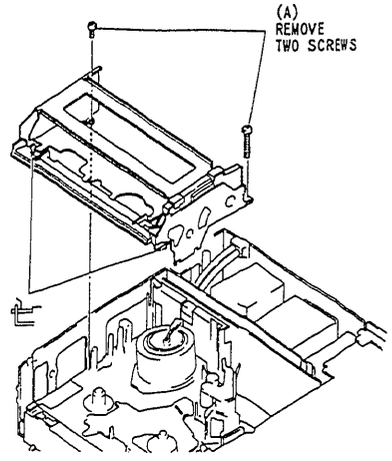


Fig. 5-1

2. Side Gear Bracket, Chassis Holder, FL Drive Arm, Cassette Holder Assembly and Front Holder

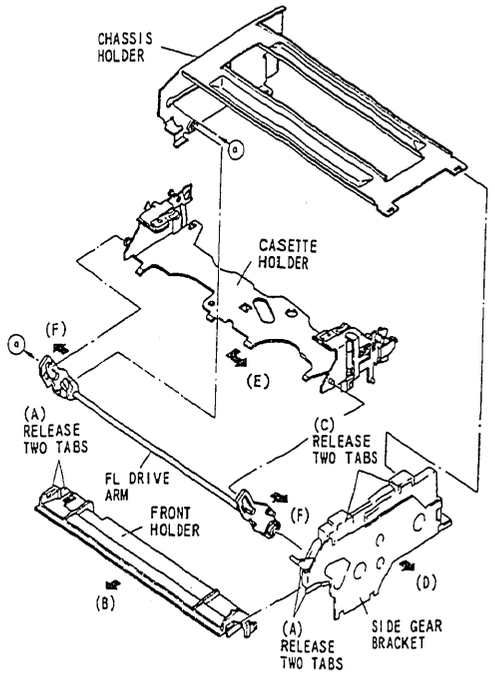


Fig. 5-2

◆ Cautions when reinstalling
1) Check the insertions of 6 bosses.

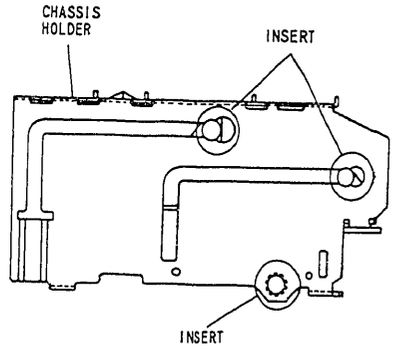


Fig. 5-3

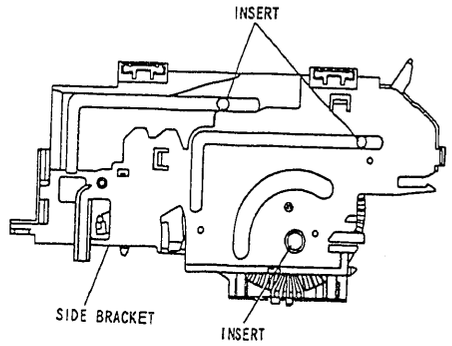


Fig. 5-4

3. Gear Bracket, Door Arm, FL Gears (A),(B) and Switch Arm

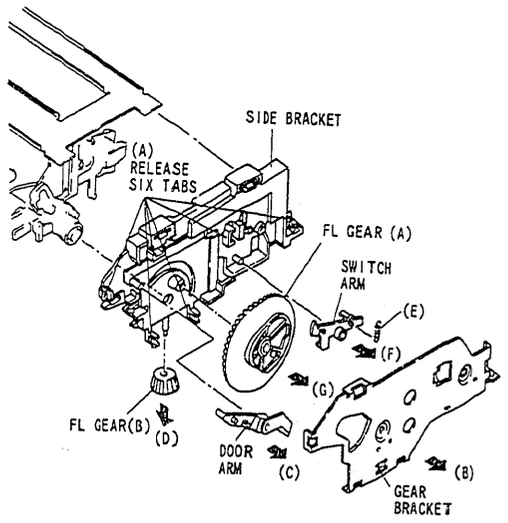


Fig. 5-5

◆ Cautions when reinstalling
1) When reinstalling FL gear (A), align the hole in FL gear (A) and the hole in the side bracket.

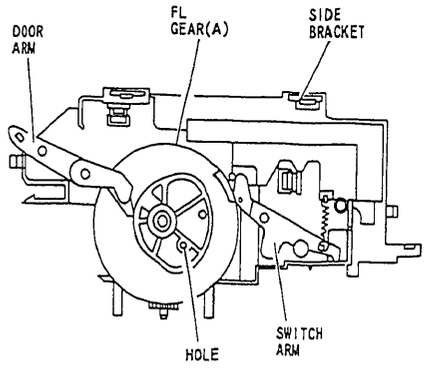


Fig. 5-6

6. MAIN MECHANICAL COMPONENTS REMOVAL

1. FE (Full Erase) Head

◆ Caution when reinstalling
1) Keep the surface of the FE head and supply guide pole which is in contact with the tape clean.

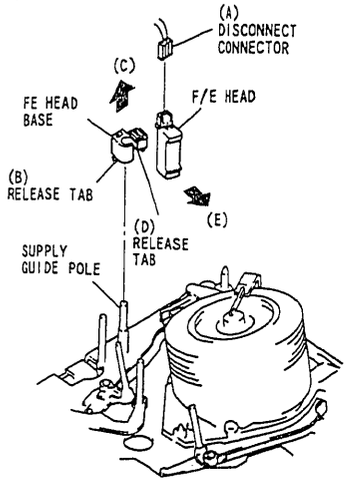


Fig. 6-1

2. A/C (Audio/Control) Head

◆ Cautions when reinstalling
1) Hook the bottom of the spring under the head base to the chassis and the top to the stopper of the head base.
2) Keep the surface of the A/C head which is in contact with the tape clean.

◆ Adjustments after reinstalling
1) A/C (Audio/Control) Head Adjustment
2) X-Value Adjustment
3) Audio Bias Level Adjustment

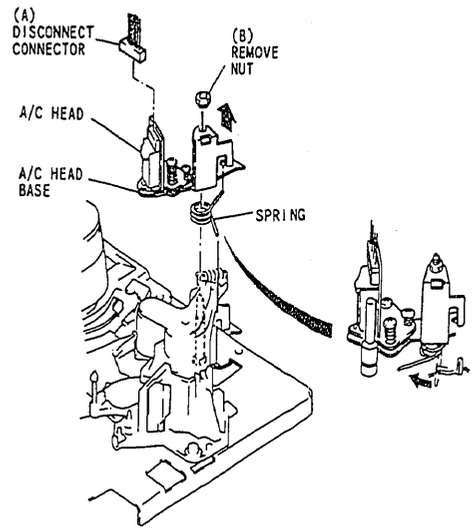


Fig. 6-2

3. Upper Cylinder (Video Heads) and Head Cleaning Bracket Assembly

◆ Cautions during work
1) Pull out the upper cylinder vertically to the cylinder attachment direction.
2) Do not touch video head tips.

◆ Cautions when reinstalling
1) Put the hole in the upper cylinder onto the pole of the lower cylinder.
2) Tighten the two upper cylinder retaining screws alternately.

◆ Adjustment after reinstalling
1) Adjustment after replacing the cylinder (video heads).
2) Head Switching Point Adjustment.

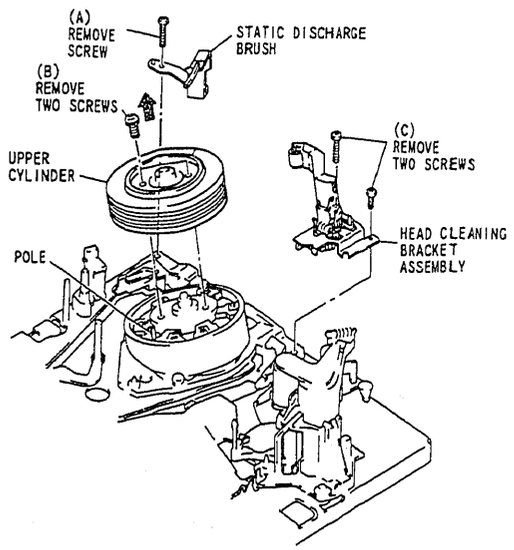


Fig. 6-3

4. Cylinder Motor Assembly

◆ Cautions during work
1) Place the side of the unit down for working.
2) Do not touch video head tips.

◆ Adjustment after reinstalling
1) Adjustment after replacing the cylinder (video heads).

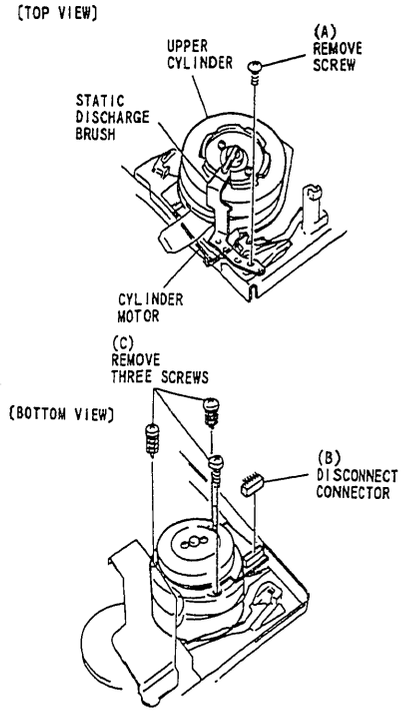


Fig. 6-4

5. Capstan Motor Assembly

◆ Components to remove previously
1) Remove the drive belt.

◆ Caution when reinstalling
1) Keep the surface of the capstan shaft which is in contact with the tape clean.

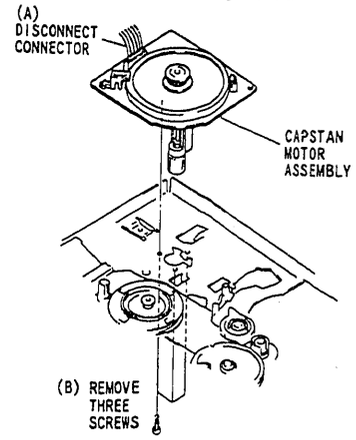


Fig. 6-5

6. Tension Band/ Tension Arm/ Tension Drive Arm

◆ Caution when reinstalling
1) Keep the surface of the tension pole which is in contact with the tape clean.
2) Insert the boss of this arm into the groove in cam gear (A). (See Fig. 6-7)

◆ Adjustments after reinstalling
1) Tension Pole Position and Tension Adjustment

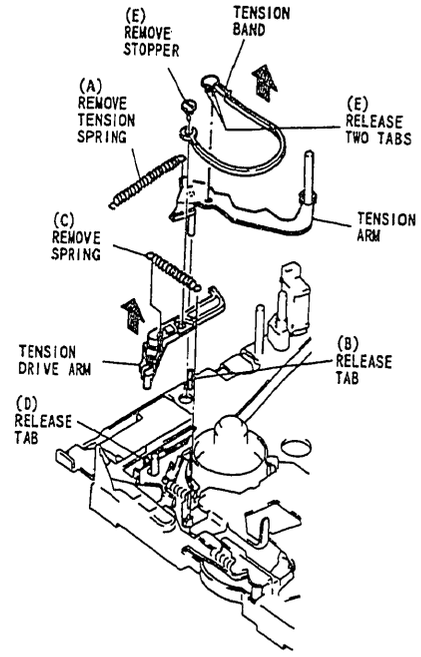


Fig. 6-6

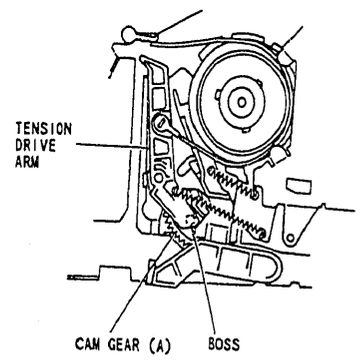


Fig. 6-7

7. Safety Arm

◆ Components to remove previously
1) Tension Band/Tension Arm/Tension Drive Arm (Item 6-6)

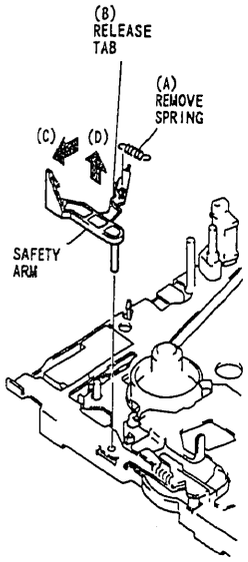


Fig. 6-8

8. Upper Plate, Torque Change Arm, Supply/Take-up Main Brakes
Note: Refer to item 23 on page 2-14 for the procedure to install the torque arm.

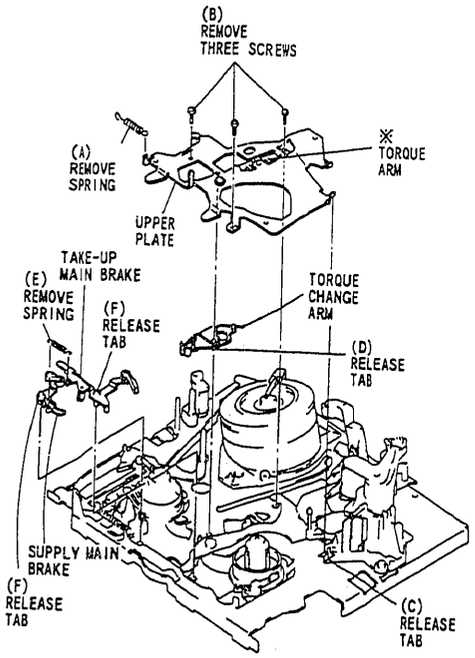


Fig. 6-9

9. Supply/Take-up Reel Disks, Supply/Take-up Sub Brakes

◆ Components to remove previously
1) Upper Plate, Supply/Take-up Main Brakes (Item 6-8)
2) Tension Arm/Tension Band Assembly (Item 6-6)

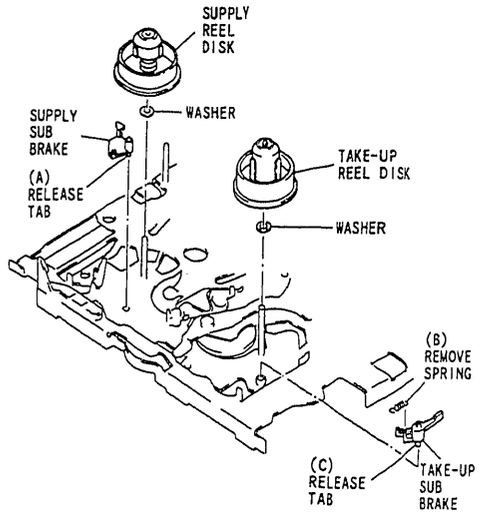


Fig. 6-10

10. Pressure Roller Assembly

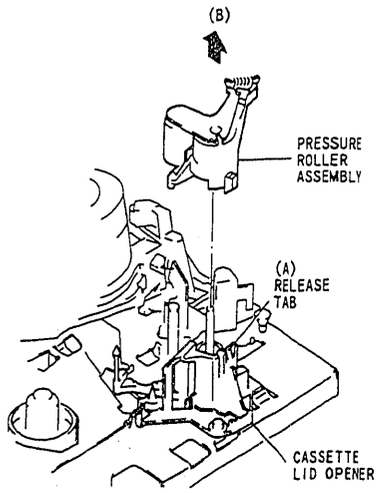


Fig. 6-11

11. Pressure Roller Cam Gear, Cassette Lid Opener and Middle Pole

◆ Components to remove previously
1) Pressure Roller Assembly (Item 6-10)
◆ Caution when reinstalling
1) Keep the surface of the middle pole which is in contact with the tape clean.
2) Hook the spring between the middle pole and chassis.
3) Align mark (○) on the pressure roller cam gear and mark (△) on the pressure roller drive gear. (See Fig. 6-15)

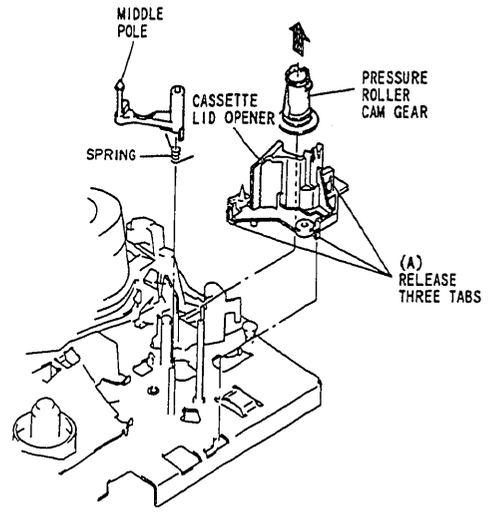


Fig. 6-12

12. Pressure Roller Drive Gear

◆ Components to remove previously
1) Upper Plate (Item 6-8)
2) Pressure Roller Assembly (Item 6-10)
3) Pressure Roller Cam Gear, Cassette Lid Opener and Middle Pole (Item 6-11)
◆ Caution when reinstalling
1) Align hole (A) in the pressure roller drive gear and the hole in the chassis. Also align the markings on the pressure roller drive gear and arm.

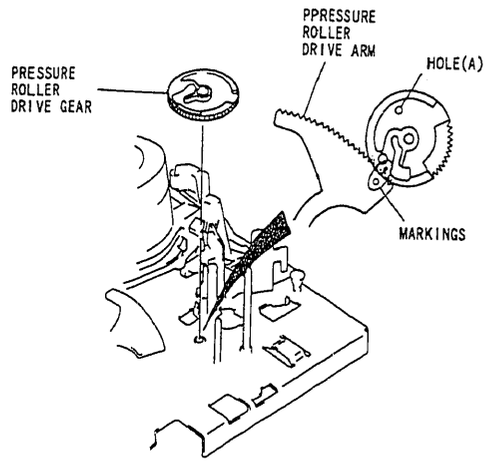


Fig. 6-13

13. Pressure Roller Drive Arm and Fine Slow Brake Arm

◆ Components to remove previously
1) Head Cleaning Bracket Assembly (Item 6-3)
2) Upper Plate (Item 6-8)

◆ Caution when reinstalling
1) Check that the boss of the pressure roller drive arm is securely inserted into the groove in cam gear (B). (See Fig. 6-15)
2) Align hole (A) in the pressure roller drive arm and the hole in the chassis. (See Fig. 6-15)

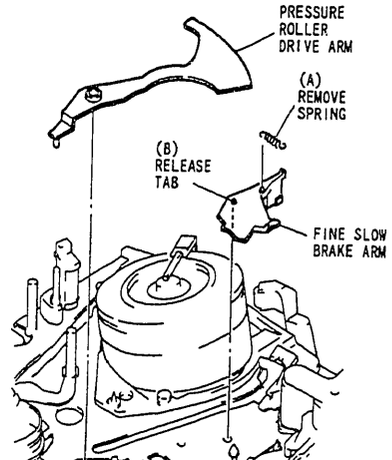


Fig. 6-14

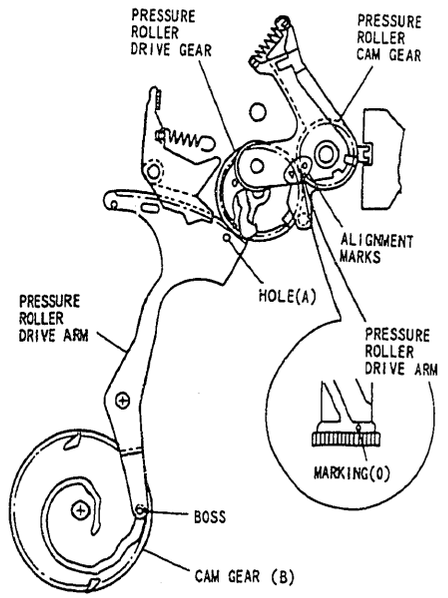


Fig. 6-15

14. Supply/Take-up Guide Rollers

◆ Caution when reinstalling
1) Keep the surface of the guide roller which is in contact with the tape clean.

◆ Adjustments after reinstalling
1) Guide Roller Height Adjustment

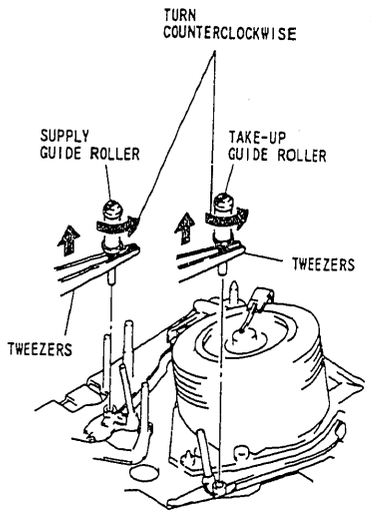


Fig. 6-16

15. Cylinder Motor Base

◆ Components to remove previously
1) Head Cleaning Bracket Assembly (Item 6-3)
2) Cylinder Motor Assembly (Item 6-4)

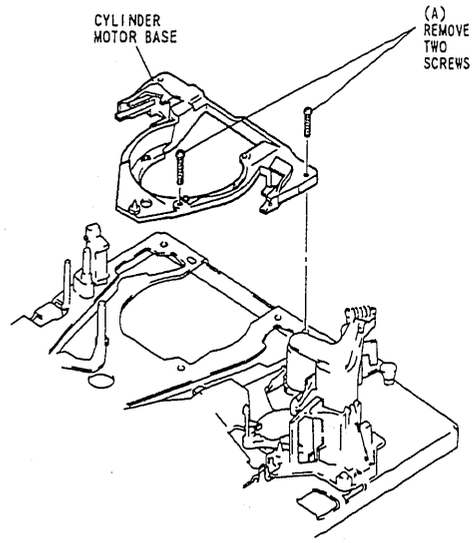


Fig. 6-17

16. Centre Pulley, FL Relay Gear (B)

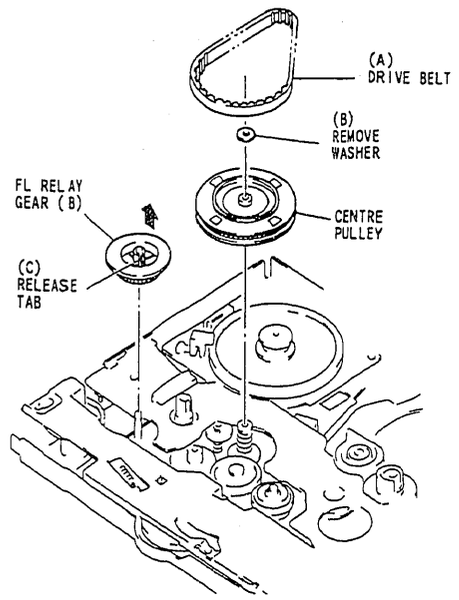


Fig. 6-18

17. Reel Drive Idler, Reel Gears -(L)/(R)

◆ Components to remove previously
1) Centre Pulley (Item 10-16)

◆ Caution when reinstalling
1) Install the spring between the idler and washer.

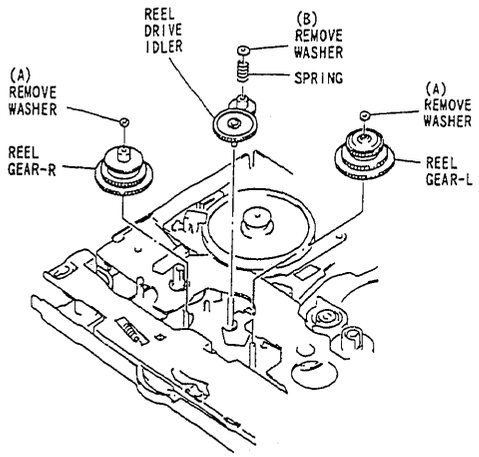


Fig. 6-19

18. Roller Plate, Mode Gear

◆ Caution when reinstalling
1) Align mark (G) on cam gear-A and mark (F) on the mode gear. (See Fig. 6-23)
2) Align the arrow on the sensor P.C.B and arrow (No.1) on the mechanism state switch. (See Fig. 6-23)
3) With the above conditions, align mark (B) on the mechanism state switch and mark (C) on the mode gear. (See Fig. 6-23)

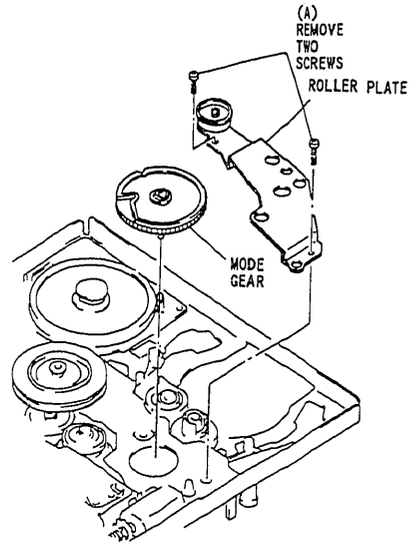


Fig. 6-20

19. Gear Plate, Relay Gear, Wheel Gear, Take-up Brake Sub Arm, Latch Arm, Relay Gear -(C), Cam Gears (A)/(B)

◆ Caution when reinstalling
1) Align hole (A) in the cam gear-(A) and the hole in the chassis.
Also align mark (G) on the cam gear-(A) and mark (F) on the mode gear. (See Fig.6-23)
2) Check that the bosses of the supply sub brake and tension drive arm are inserted into the specified positions. (See Fig. 6-22)
3) Align mark (I) in the cam gear-(B) and mark (H) on the cam gear-(A). (See Fig. 6-23)
4) Check that the boss of the pressure roller drive arm is inserted into the groove in the cam gear-(B). (See Fig. 6-22)

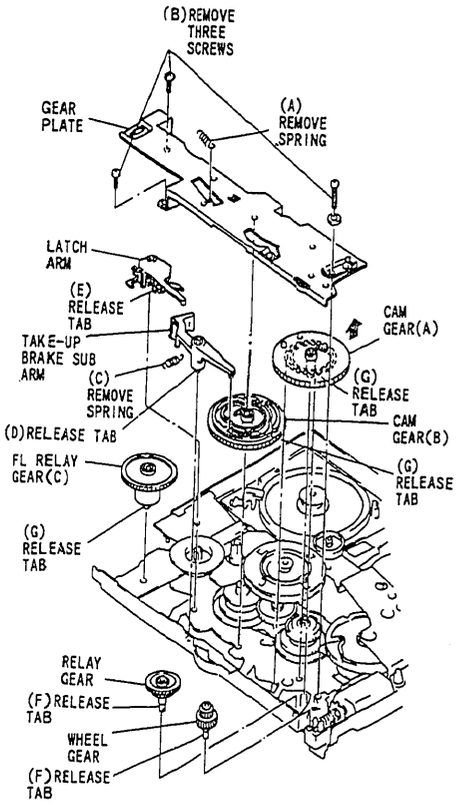


Fig. 6-21

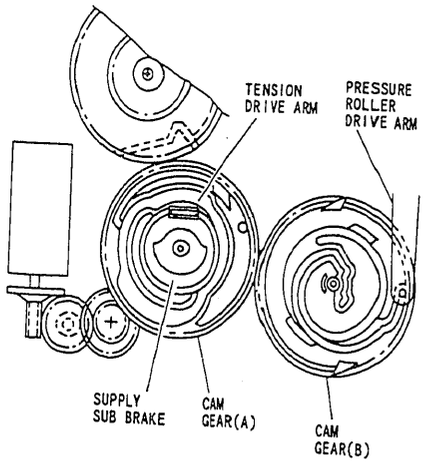


Fig. 6-22

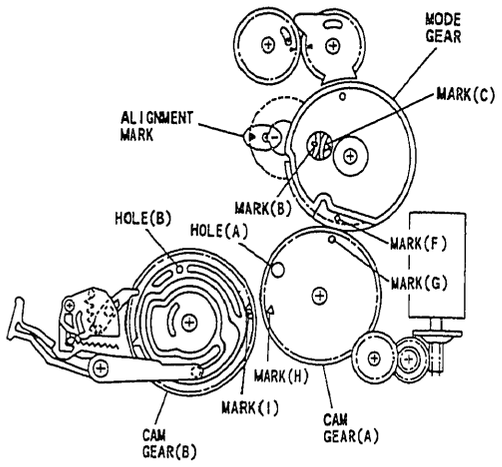


Fig. 6-23

20. Loading Motor Assembly

◆ Components to remove previously
1) FL Relay Gear (B) and Centre Pulley (Item 6-16)
2) Roller Plate, Mode Gear (Item 6-18)
3) Sensor circuit board (Item 3-6)
4) Gear Plate, Relay Gear and Wheel Gear (Item 6-19)

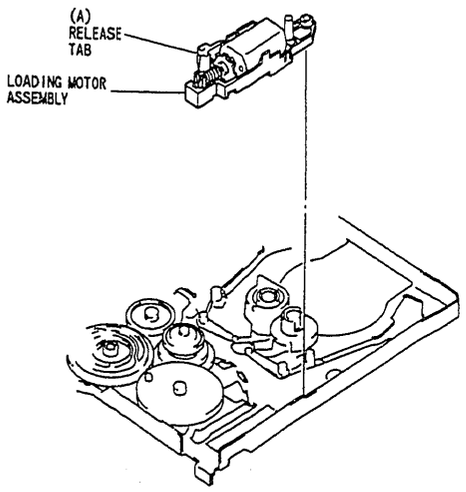


Fig. 6-24

21. FL Relay Gear -(A), FL Change Arm, FL Change Gear

◆ Components to remove previously
1) Roller Plate, Mode Gear (Item 6-18)
2) Centre Pulley, FL Relay Gear (B) (Item 6-16)
3) Sensor P.C.B (Item 3-6)

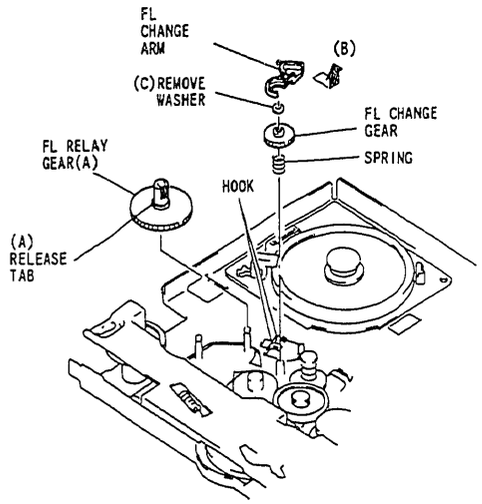


Fig. 6-25

◆ Cautions when reinstalling
Install the FL change arm by the following procedure. Do not narrow the "U"-shaped section of the arm when installing it. (See Fig. 6-26)
1) Place the arm sideways and pass it through the hole in the chassis.
2) Turn the arm to the front (to the right).
3) Push up the whole arm, taking care that section (a) of the arm does not hit the chassis and insert the bosses of the arm into the holes in the axis supports in the chassis.
4) After installing the arm, check that the arm moves smoothly.

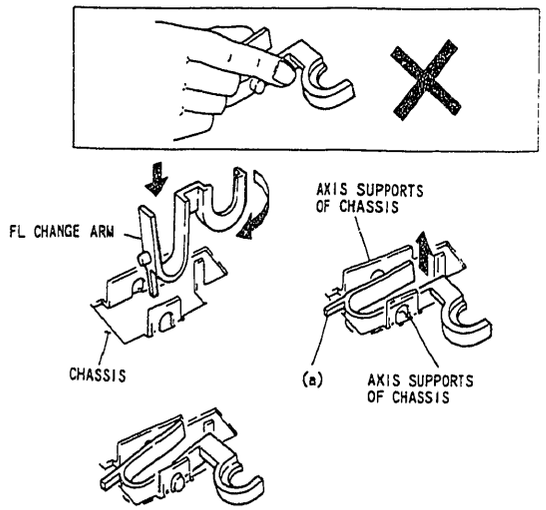


Fig. 6-26

22. Supply/Take-up Loading Arms

◆ Components to remove previously
1) Roller Plate, Mode Gear (Item 6-18)
2) Centre Pulley, FL Relay Gear (B) (Item 6-16)
3) Sensor P.C.B (Item 3-6)

◆ Caution when installation
1) Align the markings on each gear. (See Fig. 6-28)

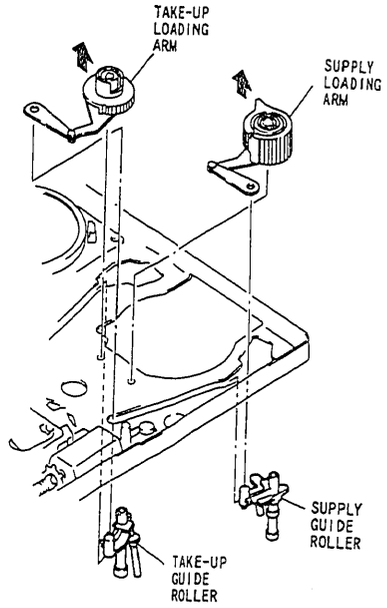


Fig. 6-27

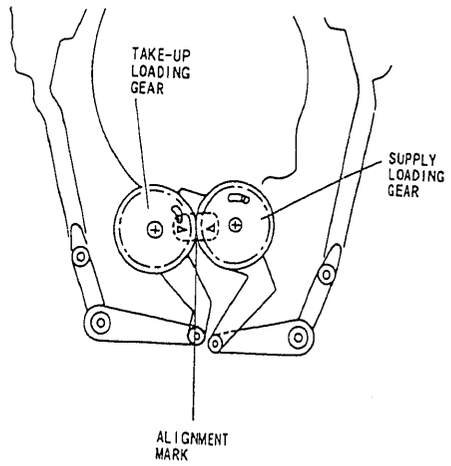


Fig. 6-28

23. Torque Arm Installation Procedure

1) Insert the torque arm as shown in the figure.
2) Fit the torque arm to the upper plate as shown in Fig. 6-29.
3) Install the torque arm into the upper plate while turning the arm in the direction of the arrow.

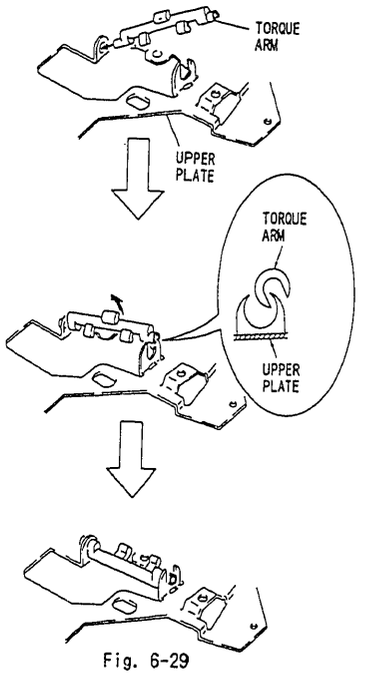
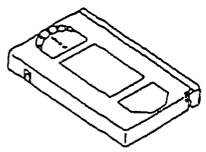
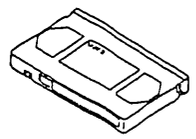
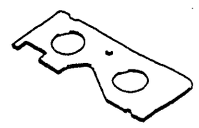
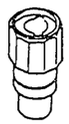
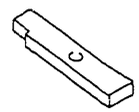


Fig. 6-29

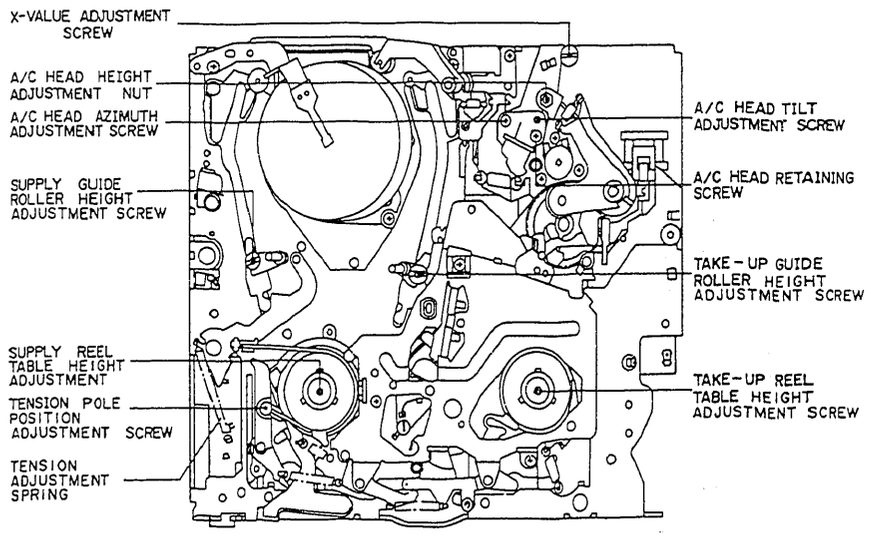
CHAPTER 3

MECHANISM ADJUSTMENT

JIGS AND TAPES FOR ADJUSTMENT

1. Back Tension Meter Parts No.7099004 	2. Alignment Tape - MH-1 - Parts No. 7099046 - 30HMP2-1 - Parts No. 7099089 - 24MASF-2 - Parts No. 7099153 	3. Master Plane Parts No.7099279 
4. Torque Gauge Parts No.7099039 	5. Torque Gauge Adaptor Parts No.7099035 	6. Reel Disk Height Jig Parts No.7099038 

ADJUSTMENT PARTS LOCATIONS


X-VALUE ADJUSTMENT SCREW
A/C HEAD HEIGHT ADJUSTMENT NUT
A/C HEAD AZIMUTH ADJUSTMENT SCREW
SUPPLY GUIDE ROLLER HEIGHT ADJUSTMENT SCREW
SUPPLY REEL TABLE HEIGHT ADJUSTMENT
TENSION POLE POSITION ADJUSTMENT SCREW
TENSION ADJUSTMENT SPRING
A/C HEAD TILT ADJUSTMENT SCREW
A/C HEAD RETAINING SCREW
TAKE-UP GUIDE ROLLER HEIGHT ADJUSTMENT SCREW
TAKE-UP REEL TABLE HEIGHT ADJUSTMENT SCREW

Top View of Mechanism

MECHANICAL PARTS ADJUSTMENT

1. Mechanism State Switch Adjustment

Purpose: To detect the mechanism state correctly and prevent malfunctions.

Test equipment/jig	Preparation for Adjustment	State of VCR	Adjustment points
· Blank tape	——	· Eject mode (with the cassette ejected)	· Mechanism state switch · Mode gear

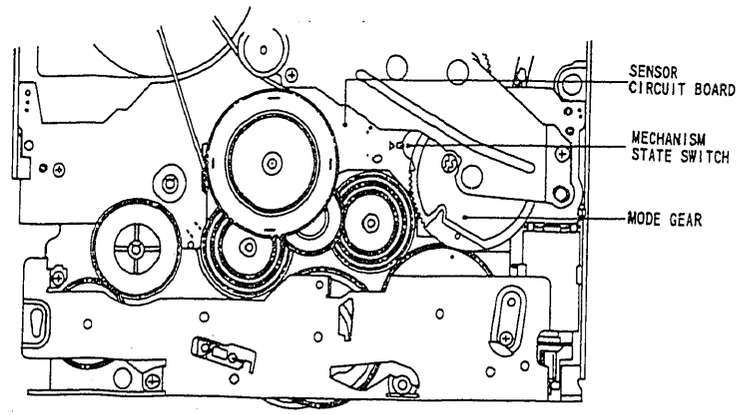
Adjustment procedure

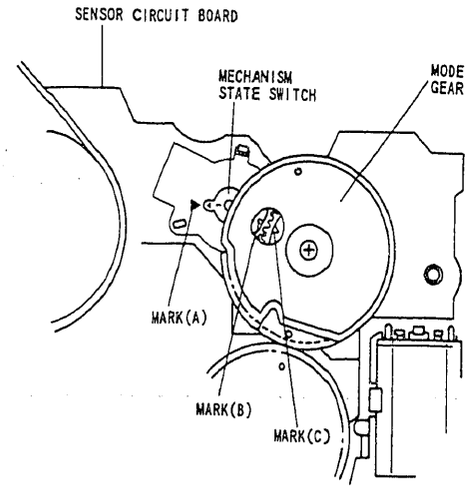
1) Check that arrow (A) on the Sensor P.C.B and the arrow of mechanism state switch indication number 1 are aligned.

2) If the above alignment is not obtained, adjust as follows.
   1. Remove the roller plate and mode gear. (See "MAIN MECHANICAL COMPONENTS REMOVAL" in CHAPTER 2.)
   2. Turn the mechanism state switch through the hole in the Sensor P.C.B to align arrow (A) on the Sensor P.C.B and the arrow of mechanism state switch indication number 1.
   3. Reinstall the mode gear so that mark (B) on the mechanism state switch and mark (C) on the mode gear are aligned.

3) Load a blank tape and perform various operations to check that loading and unloading are performed correctly.

Adjustment diagram





TAPE TRANSPORT SYSTEM PARTS ADJUSTMENT

The tape transport system is the path from the supply reel disk passing through the video heads to the take-up reel disk. The transport system parts, especially the parts which directly come into contact with a tape, should be kept clean without scratches, dust, oil, etc.
The tape transport system has been adjusted before the unit is shipped from the factory. Therefore, when parts in the transport system are replaced, the transport system is stabilized by only adjusting the new parts correctly.

1. Reel Disk Height Adjustment

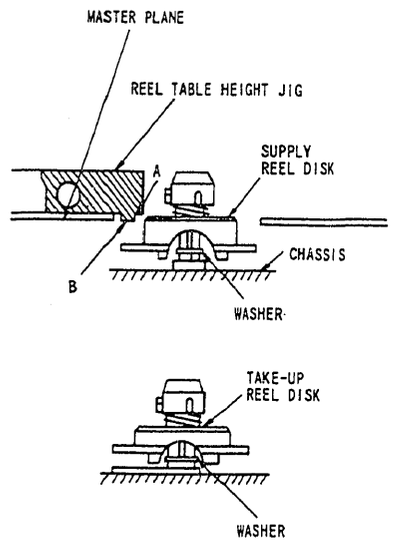
Purpose: To set the reels of the cassette to the specified height, thus determining the height of tape.

Test equipment/jig	Preparation for Adjustment	State of VCR	Adjustment points
· Master plane (Parts No.7099279) · Reel disk height jig (Parts No.7099038)	1) Remove the cassette loading mechanism. 2) Mount the master plane and place the reel disk height jig on it.	——	· Spacers in the supply and take-up reel disks

Adjustment procedure
1) Check that the reel disk is between sections A and B of the reel disk height jig.
2) If the disk is not between sections A and B of the jig, replace the spacer (0.5mm thick) in the reel disk or adjust them.

(Caution)
When the tension arm and tension band are removed, adjust the tension pole position and tension after reinstalling them.

Adjustment diagram



2. Tension Pole Position and Tension Adjustment

Purpose: To make the tension of tape constant so that the contact between the video heads and tape is stabilized.

Test equipment/jig	Preparation for Adjustment	State of VCR	Adjustment points
Position adjustment ——	——	1) Remove the top cover. 2) Set the VCR to the loading state without inserting a cassette. (See page 3-12)	Position adjustment: Tension band holder
Tension adjustment · Back Tension Meter (Parts No.7099004)	——	Tension adjustment 3) Play the tension cassette.	Tension adjustment: Tension spring hooking position

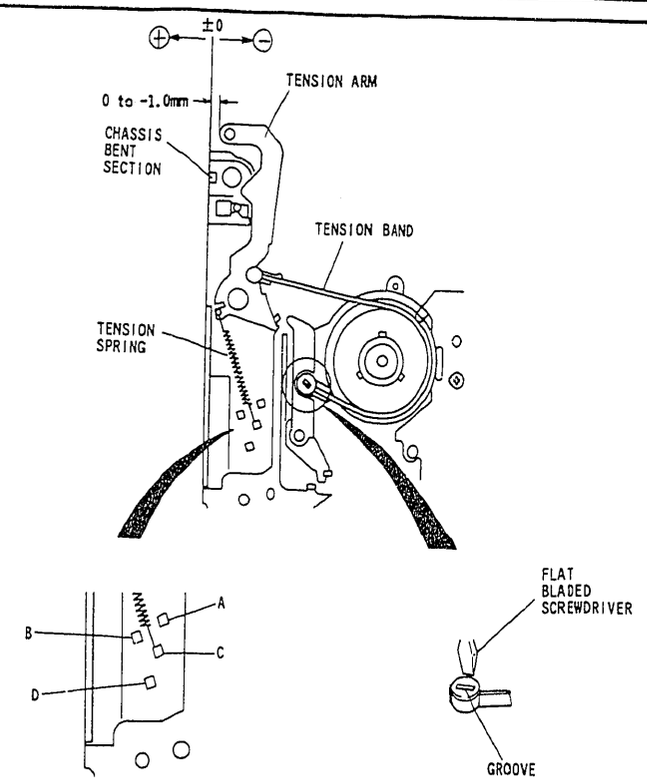
Adjustment procedure
- Position Adjustment -
1) Hook the tension spring to position (B).
2) Insert a flat bladed screwdriver into the groove for the tension position adjustment and set the clearance between the tesion arm and chassis to 0 to -1.0mm.
3) After adjustment is completed, perform loading without inserting a cassette and recheck the tension pole position.

- Tension Adjustment -
1) Hook the tension spring to position (B).
* Changing the tension arm position with this adjustment varies the back-tension torque value. Check the tension arm position without loading a tape and then set the back-tension torque to the following values.

2) When the tension arm is positioned -1 mm from the chassis bent section:
Reading of Back Tension Meter: 28 to 36 g-cm
3) When the tension arm is ±0 mm from the chassis bent section:
Reading of Back Tension Meter: 25 to 32 g-cm
4) If the reading is higher than the reference, move the spring to position (A).
If the reading is lower than the reference, move the spring to position (C).

Caution: When the tension position is changed greatly (more than 6 g-cm), recheck the tension pole position. If it is drifted, readjust the tension pole position and tension.

Adjustment diagram



3. Guide Roller Height Adjustment

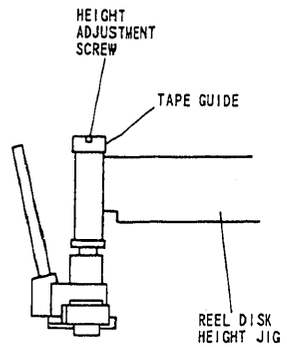
Purpose: To regulate the height of tape so that the bottom of tape runs along the tape guide line on the cylinder.

Coarse Adjustment

Test equipment/jig	Preparation for Adjustment	State of VCR	Adjustment points
• Master plane (Parts No. 7099279) • Reel disk height jig (Parts No. 7099038)	1) Remove the cassette loading mechanism. 2) Mount the master plane and place the reel disk height jig on it.	———	Height adjustment screws on the supply and take-up guide rollers

Adjustment procedure
1) Align the bottom of the guide roller's upper flange and the top of the reel disk height jig.
2) Perform the precise adjustment continuously.

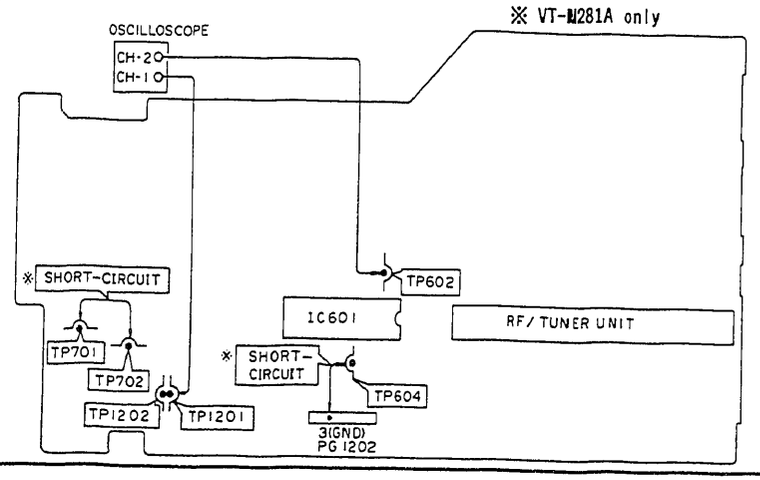
Adjustment diagram



Precise Adjustment

Test equipment/jig	Preparation for Adjustment	State of VCR	Adjustment points
• Oscilloscope • Alignment tape (30HMP2-1) (Parts No. 7099089)	• CH-1: TP1201 (PB C) • CH-2: TP602 (SW30 Hz)	• Play alignment tape (Color bars section)	• Guide roller height adjustment screws

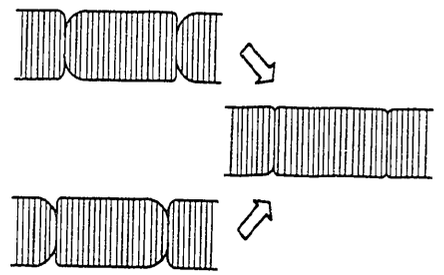
Connection diagram



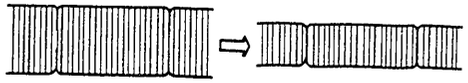
Adjustment procedure [For VT-M181A]
1) Tracking control (playback) : Center position (when this adjustment is performed after the cylinder has been replaced, set the tracking control so that the FM output is maximum.)
2) Height adjustment screw : Flatten the FM envelope.
3) Press the tracking control up and down buttons.
4) Check that the FM drops at the start and end of FM envelope are uniform.
5) Tighten the guide roller retaining screw.

Adjustment procedure [For VT-M281A]
1) Tracking control (playback) : Center position (when this adjustment is performed after the cylinder has been replaced, set the tracking control so that the FM output is maximum.)
2) Short-circuit between TP604 and GND on the main circuit board.
   Short-circuit between TP701 and TP702 on the main circuit board.
   By this, the digital display enters the test mode, and "<< >>" is displayed.
3) Height adjustmentscrew : Flatten the FM envelope.
4) Press the tracking control up and down buttons.
5) Check that the FM drops at the start and end of FM envelope are uniform.
6) Tighten the guide roller retaining screw.
7) Remove the short circuits.

Waveforms



Turn the guide roller height adjustment screw slightly to flatten the waveform.



Tracking control at center

Press the tracking control buttons.

4. Audio / Control (A/C) Head Adjustment

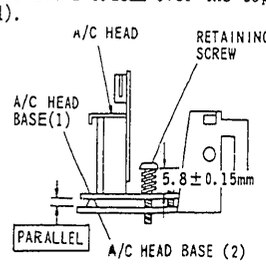
Purpose: To keep the contact between the tape and head even so the specified track is recorded and played back.

Coarse Adjustment

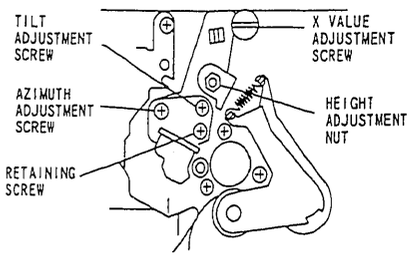
Test equipment/jig	Preparation for Adjustment	State of VCR	Adjustment points
· Blank tape	——	· Run the blank tape.	· A/C head retaining screw · Azimuth adjustment screw · Height adjustment nut · Tilt adjustment screw

Adjustment procedure/adjustment diagrams

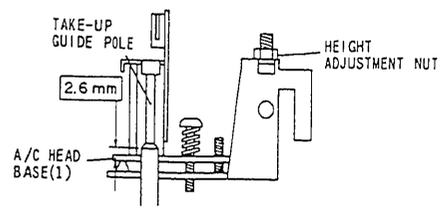
1) A/C head retaining screw: Check that the spring section of the A/C head retaining screw protrudes 5.8 ± 0.15mm over the top of head base (1).



2) Tilt adjustment hexagonal screw, azimuth adjustment screw: Make head bases (1) and (2) parallel.

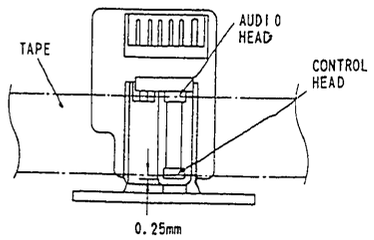


3) Height adjustment nut: Adjust the height of A/C head base (1) so that its top surface is approx. 2.6 mm lower than the bottom flange of the take-up guide pole.



4) Load a blank tape and set the VCR to the play mode.

5) Check that there is no conspicuous curling and riding over around the A/C head. If there is conspicuous curling or riding over, readjust the tilt adjustment hexagonal screw, azimuth adjustment screw and height adjustment nut. When the bottom edge of tape is 0.25 mm from the bottom edge of the control head's core, the height of A/C head is ideal.



6) Perform the precise adjustment continuously.

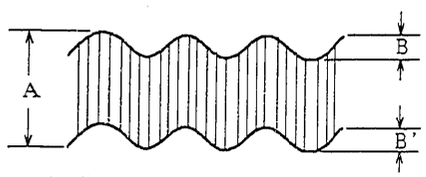
Precise Adjustment

Test equipment/jig	Preparation for Adjustment	State of VCR	Adjustment points
· Oscilloscope	· AUDIO OUT Jack	· Play alignment tape (Stairsteps section)	· Azimuth adjustment screw · Height adjustment nut · Tilt adjustment screw
· Alignment tape (Parts No. 7099046) (Parts No. 7099089)	——		

Adjustment procedure

1) Adjust the azimuth adjustment screw, height adjustment nut and tilt adjustment screw slightly and alternately: Make the audio output maximum and flat (minimum fluctuations).

Waveform diagram



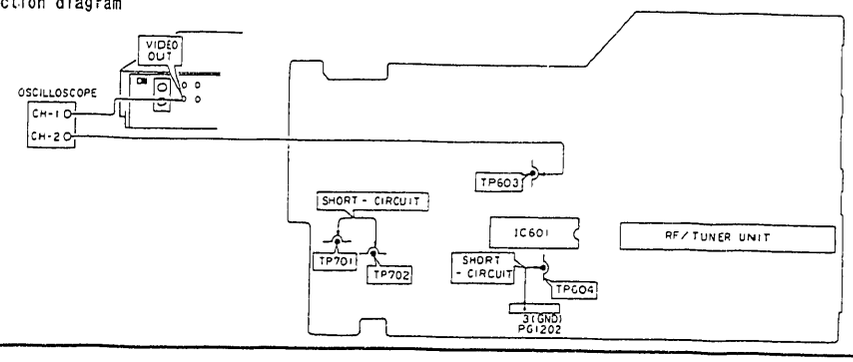
A: Maximum BB': Minimum

5. X-Value Adjustment [for VT-M281A]

Purpose: To obtain compatibility with other VCRs.

Test equipment/jig	Preparation for Adjustment	State of VCR	Adjustment points
· Oscilloscope	· CH-1: VIDEO OUTPUT jack · CH-2: TP603 (CTL PULSE)	· Play alignment tape (Stairsteps section if MH-1 alignment tape is used.)	· X-value adjustment screw
· Alignment tape (parts No. 7099046) (Parts No. 7099089)	——		

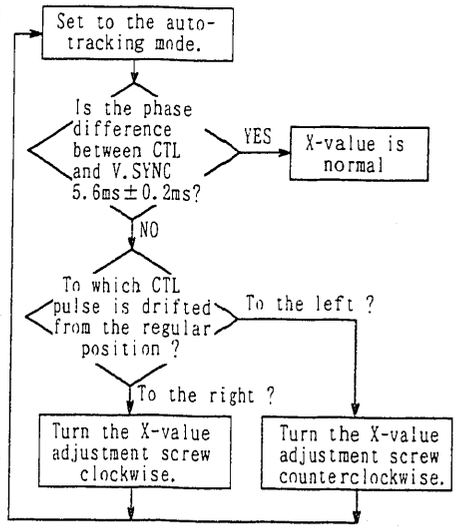
Connection diagram



Adjustment procedure

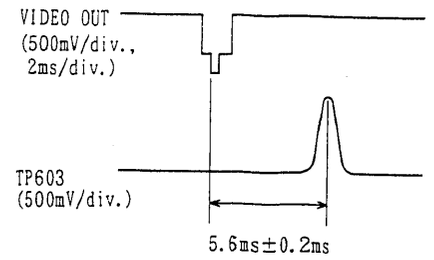
Adjust so that the phase difference between the CTL pulse (positive pulse) and V.SYNC on the video signal is 5.6ms±0.2ms when the autotracking mode.

Short-circuit between TP604 and GND on the main circuit board.
Short-circuit between TP701 and TP702 on the main circuit board.
By this, the digital display enters the test mode, and "<< >>" is displayed.


Set to the auto-tracking mode.
Is the phase difference between CTL and V.SYNC 5.6ms±0.2ms?
YES
X-value is normal
NO
To which CTL pulse is drifted from the regular position ?
To the left ?
To the right ?
Turn the X-value adjustment screw clockwise.
Turn the X-value adjustment screw counterclockwise.

◆ The autotracking function operate Press the EJECT button to remove the alignment tape and re-insert it.

Waveforms



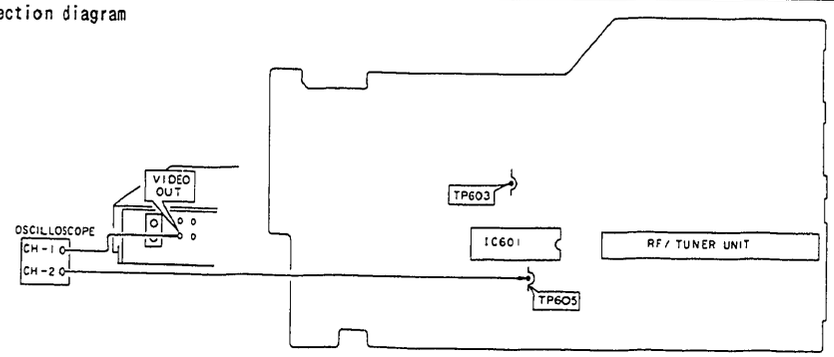
After the X-value adjustment is completed, remove the short-circuits.

6. X-Value Adjustment [for VT-M181A]

Purpose: To obtain compatibility with other VCRs.

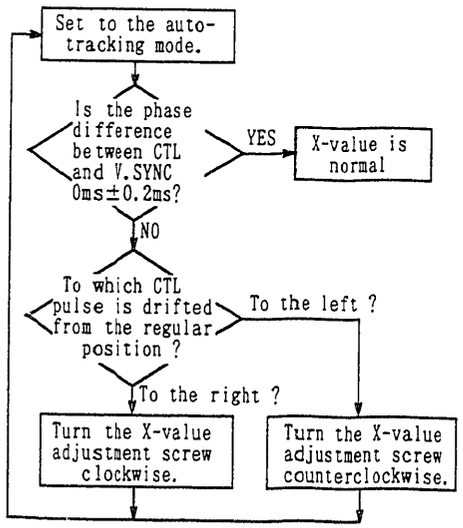
Test equipment/jig	Preparation for Adjustment	State of VCR	Adjustment points
· Oscilloscope	· CH-1: VIDEO OUTPUT jack · CH-2: TP603 (CTL PULSE)	· Play alignment tape (Stairsteps section if MH-1 alignment tape is used.)	· X-value adjustment screw
· Alignment tape (parts No. 7099046) (Parts No. 7099089)	—		

Connection diagram



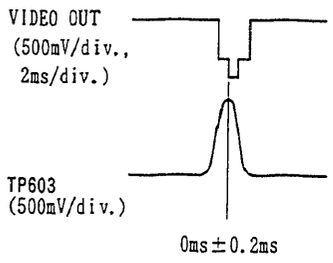
Adjustment procedure

Adjust so that the phase difference between the CTL pulse (positive pulse) and V.SYNC on the video signal is 0ms±0.2ms when the autotracking mode.


Set to the auto-tracking mode.
Is the phase difference between CTL and V.SYNC 0ms±0.2ms?
YES
X-value is normal
NO
To which CTL pulse is drifted from the regular position ?
To the left ?
To the right ?
Turn the X-value adjustment screw clockwise.
Turn the X-value adjustment screw counterclockwise.

◆ The autotracking function operate Press the EJECT button to remove the alignment tape and re-insert it.

Waveforms



After the X-value adjustment is completed, remove the short-circuits.

7. Adjustments After Replacing Cylinder (Video Heads)

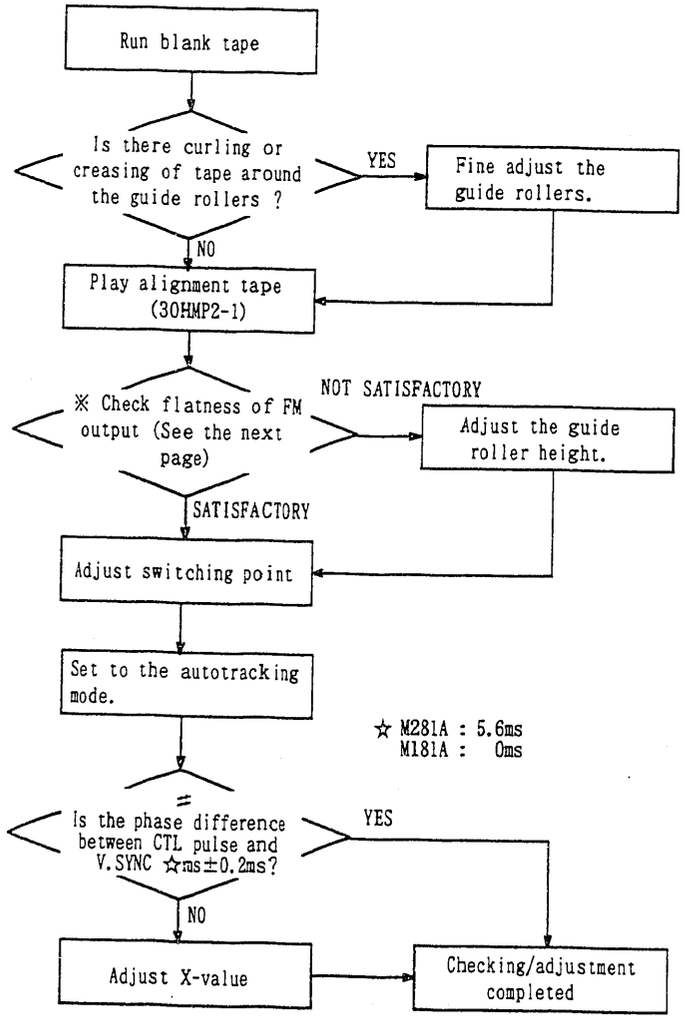
Purpose: To suppress drift in the height relative to the guide roller and to minimize the X-value after replacing the cylinder.

Test equipment/jig	Preparation for Adjustment	State of VCR	Adjustment points
· Oscilloscope	Checking the flatness · CH-1: TP1201 (PB C) · CH-2: TP602 (SW30Hz)	· Run the blank tape	· Guide rollers (precise adjustment on page 3-6) · Head switching point (page 4-3) · X-value for M281A (page 3-8) for M181A (page 3-9)
· Alignment tape (30HMP2-1) (Parts No. 7099089)		· Play alignment tape (Stairsteps section)	
· Blank tape			

Checking/adjustment procedure

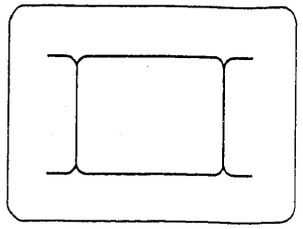
NOTE-1 : Connect test equipment referring to connection diagram on page 3-6 when checking the item marked ※.

NOTE-2 : Connect test equipment referring to connection diagram on page 3-8(for M281A) page 3-9 (for M181A) when checking the itemmarked #.

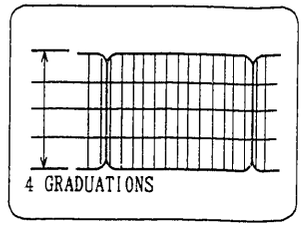


Checking procedure of the flatness and fluctuations of FM output and waveform diagrams

1) Set to the autotracking mode.

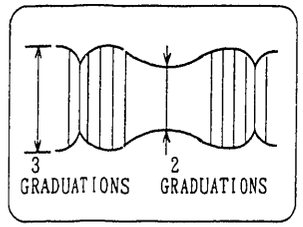


2) Fine tune the voltage level range of the oscilloscope to set the FM output to 4 graduations.



3) Press the tracking control buttons to set the maximum amplitude of the FM output to 3 graduations.

4) Check that the minimum amplitude is more than 2 graduations.



5) Check that the level fluctuations between the maximum and minimum amplitudes are less than 13%.

8. Tension/Torque Checks

Purpose: It is necessary to check the tension, torque and compression force at the tape take-up section and moving section to make the tape running smooth and satisfy the basic performance of the VCR. Check these if the tape running is not smooth or the tape speed is abnormal.

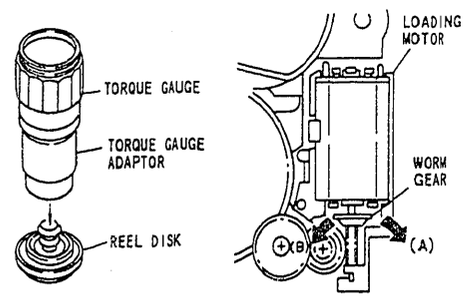
Test equipment/jigs		State of VCR	
• Torque gauge • Torque gauge adaptor		• Set the VCR to each operation mode without inserting a cassette. (See page 3-10)	
Item	VCR operation mode	Measured reel	Measured value
Main brake torque	Stop (Note)	Supply & take-up reels	100 ~ 200 g·cm
Slack removal torque	Unloading	Supply reel	120 ~ 250 g·cm
Fast forward torque	Fast forward	Take-up reel	400 g·cm or more
Rewind torque	Rewind	Supply reel	400 g·cm or more
Take-up torque	Play	Take-up reel	40 ~ 70 g·cm
Back-tension torque	Fast forward/Rewind	Supply/Take-up reel	3 ~ 13 g·cm

Checking method

The values are measured using a torque gauge and torque gauge adaptor with the torque gauge fixed.

Note: Turn the worm gear in the direction of arrow (A) to shift the mechanism state switch indication number to "3".
Then turn the worm gear in the direction of arrow (B) so the main brakes are applied to the reel disks.

Adjustment diagram

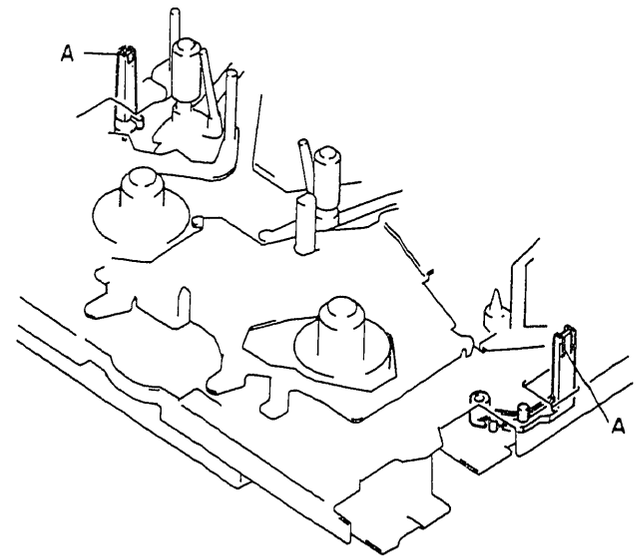


9. To Set the VCR to the Loading State without Inserting a Cassette

1) Remove the top cover and front panel.
2) Remove the cassette loading mechanism.
3) Unplug the power cord form the AC outlet.
4) Cover the supply and take-up end sensors (sections A in the figure below) with black masking tape, etc. to shut off the light.
5) Plug the power cord into the AC outlet.
6) Turn the VCR on.
The VCR can accept the inputs of each mode in this state. However, the rewind operation cannot be performed for more than a few seconds because the take-up reel disk is in the stop state and reel pulses cannot be detected.

(Cautions)
Always return the VCR to the original state in the following order after the above operations have been performed.
1) Remove the masking tape, etc. from the supply and take-up end sensors.
2) Unplug the power cord from the AC outlet to reset the main microprocessor.

Adjustment diagram



MAINTENANCE/INSPECTION PROCEDURE

1. Required Maintenance

The recording density of a VTR is much higher than that of an audio tape recorder. VTR components must be very precise, at tolerances of 1/1000 mm, to ensure compatible with other VTRs. If any of these components are worn or dirty, the symptoms will be the same as if the part is defective. To ensure a good picture, periodic inspection and maintenance, including replacement of worn-out parts and lubrications, is necessary.

2. Scheduled Maintenance

Schedules for maintenance and inspection are not fixed because they are greatly according to the way in which the customer uses the VTR, and the environment in which the VTR is used. But, in general home use, a good picture will be maintained if the inspection and maintenance is done every 1,000 hours. The table below shows the relation between time used and inspection period.

Table 1

Average hours used per day	When inspection is necessary: About 1 year	About 18 months	About 3 years
One hour			
Two hours			
Three hours			

3. Check before starting Repairs

The following faults can be remedied by cleaning and oiling. Check the need for lubrication and the conditions of cleanliness in the unit. Check with the customer to find out how often the unit is used. If from that you determine that the unit is ready for inspection and maintenance, check the following parts.

Table 2

Phenomenon	Inspection Location
Poor S/N, no colour	Dirt on video head or worn video head
Tape does not run or tape is slack	Dirt on pressure roller, reel belt or flywheel belt
Vertical jitter, horizontal jitter	Dirt on video head or in tape transport system
Colour beats	Dirt on full-erase head
Low volume or sound distorted	Dirt on audio/control head
Fast forward or rewind is not done or rotation is slow	Dirt on reel belt

4. Tools Needed for Inspection and Maintenance

(1) Head cleaning kit
(2) VTR oil kit
(3) Alcohol
(4) Gauze
(5) Screwdriver for adjusting X-value

Table 3 Locations for Greasing and Oiling using the Kit

Name	Oil or Greasing Location
Sonic Slidas Oil (#1600)	Oil low-speed rotating sections
Molicoat (PG-641)	Lubricate metal or molded sections under light load
Lock paint	Fix adjustment screws

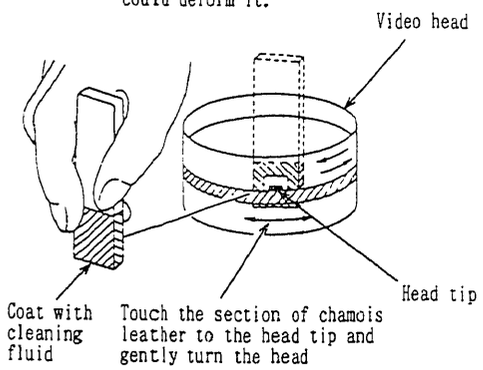
The above oils and greases are in the kit prepared especially for VTR maintenance. Use this kit for lubrication.

5. Maintenance Procedures

5-1 Cleaning

(1) Cleaning video head
First use a cleaning tape. If dirt on head is too stubborn to remove by tape, use the cleaning kit. Moisten the cleaning stick with cleaning fluid at the point indicated. Touch the stick to the head tip and gently turn the head (rotating cylinder) to the right and left. (Do not move the stick vertically and make sure that only the chamois leather on the stick comes into contact with the head. Otherwise, the head may be damaged.) Thoroughly dry the head. Then test run a tape. If cleaning fluid remains on the video head, the tape may be damaged when it comes into contact with the head surface.

(2) Cleaning the tape transport system and drive system, ect.
Wipe with gauze moistened with alcohol.
Notes: 1) The tape transport system is the system which comes into contact with the running tape. The drive system consists of those parts which run the tape.
2) Make sure that during cleaning you do not touch the tape transport system with the tip of a screwdriver and that no force is applied to the system that could deform it.


Video head
Head tip
Coat with cleaning fluid
Touch the section of chamois leather to the head tip and gently turn the head

5-2 Lubrication

(1) Guidelines for lubricating with oil
Use the oiler to apply one or two drop of Sonic Slidas oil. Make sure not to use too much oil because it may spill over or leak out coming into contact with rotating parts and causing slippage or other problems. If too much oil is applied, wipe clean with alcohol.

(2) Periodic oil lubrication
Oil specified locations every 1,000 hours.

5-3 Greasing

(1) Greasing guidelines
Apply grease Molicoat, with a stick or brush. Do not use excess grease. It may come into contact with the tape transport or drive system. Wipe any excess and clean with gauze moistened with alcohol.

(2) Periodic greasing
Grease specified locations every 5,000 hours.

6. Inspection Locations

Phenomenon	Inspection Location	Replacement	
Colour beats	Dirt on full erase head		→ ①
Poor S/N, no colour	Dirt on video heads	○	→ ②
Vertical jitter	Dirt on video heads		→ ③
	Dirt in tape transport system		
Low volume, sound distorted	Dirt on audio/control head	○	→ ④
Tape does not run. Tape is slack.	Dirt on pressure roller	○	→ ⑤
Does not fast forward or rewind, or rotation is slow	Dirt on drive belt	○	→ ⑥
Tape dose not run			
Slack tape			

Note:
If locations marked with "○" do not operate normally after cleaning, they are worn. Replace.
See the EXPLODED VIEWS at the end of this manual as well as the above illustrations for the sections to be lubricated and greased.

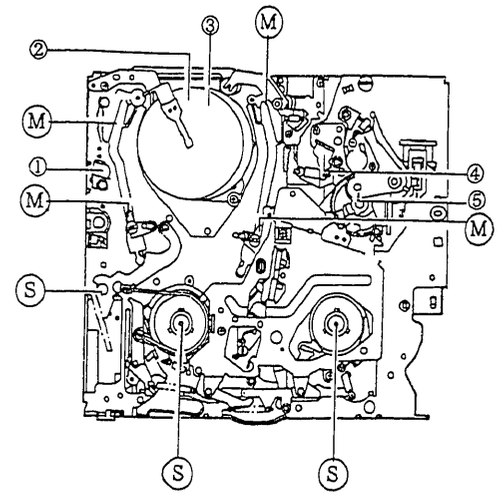


Fig. 1 Top View of Mechanism

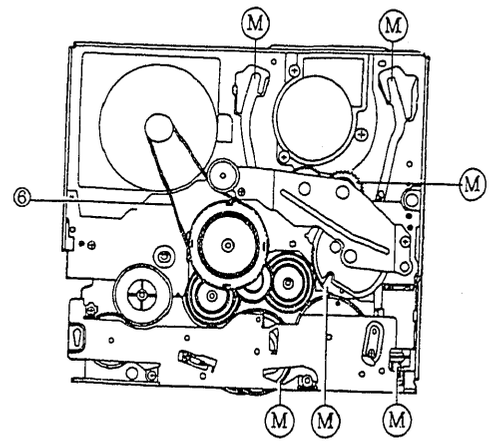


Fig. 3 Bottom View of Mechanism

(S) : Sonic Slidas oil (oil locations)
(M) : Molycoat (grease locations)

7. Parts to be Maintained/Inspected and Maintenance/Inspection Schedules

Caution: The following table does not apply to all the units. The maintenance/inspection schedules depend on the way in which the unit is used and the environment in which it is used.

Table 4

Parts and point of Maintenance	1000h	2000h	3000h	4000h	5000h
Video Head (Upper Cylinder)	C/R	C/R	C/R	C/R	C/R
Audio/Control (A/C) Head	C	C/R	C	R	C
Full Erase (FE) Head	C	C	C	R	C
Supply Guide Roller	C	C	C/R	C	C
Take-up Guide Roller	C	C	C/R	C	C
Tension Band		R		R	
Tension Arm	C	C	C	C	C
Supply Reel Disk		C		C	
Take-up Reel Disk		C		C	
Pressure Roller Arm	C	R	C	R	C
Drive Belt		C		C	
Capstan Motor	C	R	C	R	C
Loading Motor				R	
Cylinder Motor		R		R	
Mechanisim State Switch				(R)	
Reel Gear L		R		R	
Reel Gear R		R		R	
Reel Drive Idler		R		R	
Inclined Guide of Supply Guide Roller Base	C	C	C	C	C
Inclined Guide of Take up Guide Roller Base	C	C	C	C	C
Impedance Roller	C	C	C	C	C
Tape Guides (Guide Poles)	C	C	C	C	C
Lead of Lower Cylinder	C	C	C	C	C
Take-up Main Brake	C	C/R	C	C/R	C
Supply Main Brake	C	C/R	C	C/R	C
Head Cleaning Roller Assy.					(R)
Shaft of Supply Reel Disk		S		S	
Shaft of Take-up Reel Disk		S		S	
Shaft of Reel Gear L		S		S	
Shaft of Reel Gear R		S		S	
Shaft of Center Pulley		S		S	
Shaft of Pressure Roller Arm		M		M	
Guide Roller Base sliding part of Chassis					M
Contacting part of Cylinder Base and tip of Guide Roller Base					M
Contacting part of Tension Arm and Supply Guide Roller Base					M
Sliding part of chassis, Upper Plate and Pressure Roller Drive Arm					H

R : Part replacement
C : Cleaning
S : Oil (Sonic Slidas Oil) refilling
M : Grease (Molicoat) refilling

CHAPTER 4

ELECTRIC CIRCUIT ADJUSTMENT

Test equipment and tapes necessary for adjustment

1) Dual-trace oscilloscope
2) Color bar generator
3) VTVM
4) DC voltmeter
5) Frequency counter
6) Monitor TV (with A/V jacks)
7) Alignment tapes
   - MH-1 : Parts No. 7099046
   - 30HMP2-1 : Parts No. 7099089
   - 24HMASF-2: Parts No. 7099153 (Hi-Fi alignment tape)
8) Blank tape

Cautions on adjustments

1) If there are no special instructions, the following conditions apply.
   - Oscilloscope probe: 10:1
   - Oscilloscope synchronization: Internal sync
   - Ground of test equipment: TP1803 (GND) on Main P.C.B
2) When making more than one adjustment, perform the adjustments in the order listed.

Servicing positions

The circuit boards can be set to the servicing positions as follows when servicing and adjusting the VCR.

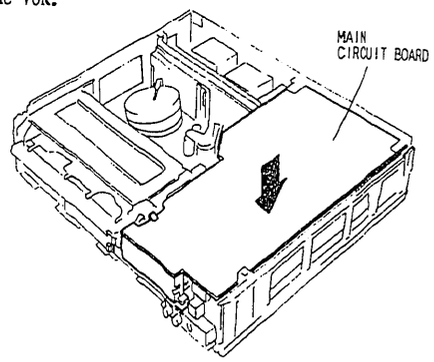


Fig. 1

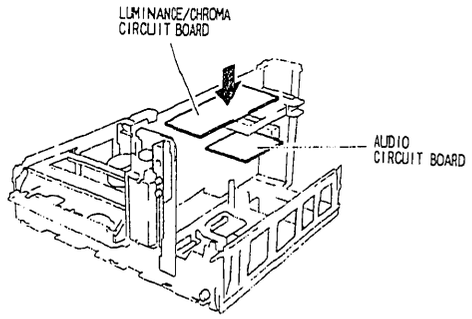
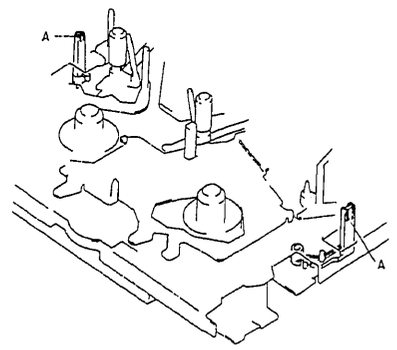


Fig. 2

Usable servicing methods

1. To reset the microprocessor
   All microprocessors installed in the unit will be reset once the AC power cord is removed from the AC outlet.
2. To set the VCR to the loading state without loading a cassette
   1) Unplug the power cord from the AC outlet.
   2) Cover the supply and take-up end sensors (sections A in the figure below) with black masking tape, etc. to shut off the light.
   3) Plug the power cord into an AC outlet.
   4) Turn the VCR on.
   The VCR can accept the inputs of each mode in this state. However, the rewind operation cannot be performed for more than a few seconds because the take-up reel disk is in the stop state and reel pulses cannot be detected.

   [Cautions]
   Always return the VCR to the original state in the following order after the above operations have been completed.
   1) Remove the masking tape, etc. from the supply and take-up end sensors.
   2) Unplug the power cord from the AC outlet once to reset the system control microprocessor.



3. To set the tracking to the center
   If Tracking: Center is specified, press the TRACKING UP(▲) and DOWN(▼) buttons simultaneously to set tracking to the center.

Adjustment Parts Locations

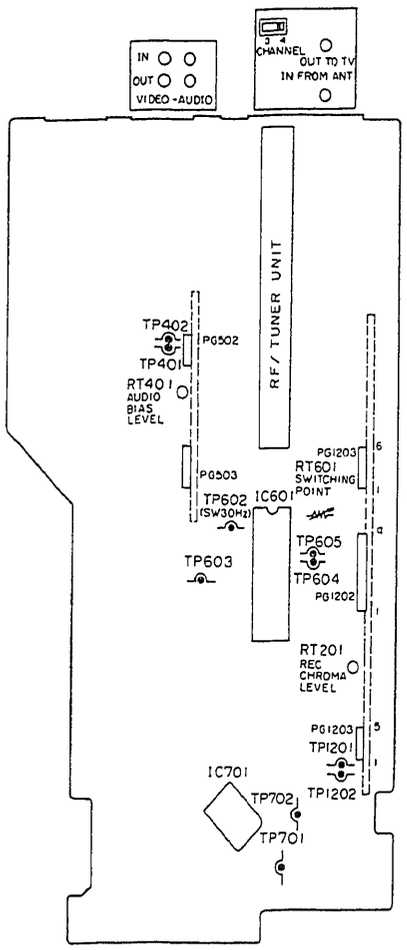


Fig. 1 Main Circuit Board (Solder Side)

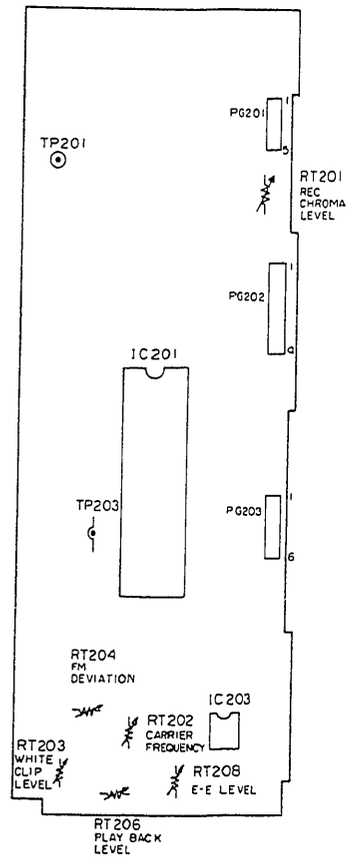


Fig. 2 Luminance/Chroma Circuit Board (Component Side)

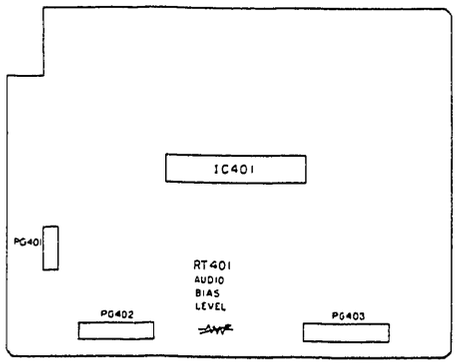


Fig. 3 AUDIO Circuit Board (Component Side)

1. SERVO CIRCUIT ADJUSTMENT

1. Head Switching Point Adjustment

Purpose of adjustment and fault occurring if incomplete

Purpose: To set the video head switching point during play to approximately the center where the CH-1 and CH-2 envelopes overlap each other.

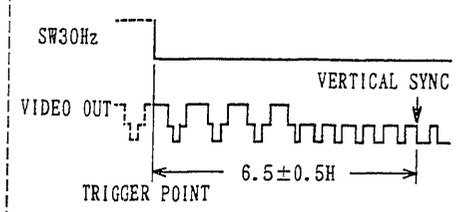
Fault:
- The vertical sync signal is degraded and vertical jitter occurs.
- Switching noise appears across the bottom of the screen.

Test Equipment/Jigs	Test Equipment Connection Points	VCR State	Adjustment Point
• Oscilloscope	• CH-1: VIDEO OUT • CH-2: TP602(SW30Hz)	• Play alignment tape (30HMP-2)	• RT601 (SWITCHING POINT)
• Alignment tape (MH-1) (Parts No.7099046)			

Adjustment Procedure

Vertical sync signal:
Set to 6.5H±0.5H from the trailing edge (trigger position) of the SW30Hz pulse.
<Settings of oscilloscope>
- Trigger with CH-2.
- Set the sync slope to "-".

Waveforms



2. Vertical Jitter Correction

Purpose of adjustment and fault occurring if incomplete

Purpose: To Suppress vertical jitter during slow motion and still play.

Fault: Vertical jitter occurs in the picture during slow motion and still play.

Test Equipment/Jigs	Test Equipment Connection Points	VCR State	Adjustment Point
• Color bar generator • Monitor TV • Blank tape • Remote Control	• VIDEO IN • Check with monitor TV	• Record color bar signal and play it back with the same VCR.	• TRACKING UP (Remote control) • TRACKING DOWN (Remote control)

Adjustment Procedure

- EP V. jitter correction -
Record in the EP mode and play back in the still mode with the same VCR.
1) Press the PAUSE button of the VCR to set it to the still play mode.
2) Suppress vertical jitter in the picture.

- SP V. jitter correction -
Record in the SP mode and play back in the still mode with the same VCR.
1) Press the PAUSE button of the VCR to set it to the still play mode.
2) Suppress vertical jitter in the picture.

3. Slow Tracking Preset Adjustment (For VT-M281A)

Purpose of adjustment and fault occurring if incomplete

Purpose: To adjust the timing with which brake pulses are generated for the capstan motor during slow play and minimize noise.

Fault:

Test Equipment/Jigs	Test Equipment Connection Points	VCR State	Adjustment Point
• Color bar generator • Monitor TV • Blank tape	• VIDEO IN • Check with monitor TV	• Unplug the power cord from AC outlet to set slow tracking to the center.	• TRACKING UP (Remote control) • TRACKING DOWN (Remote control)

Adjustment Procedure

- EP Adjustment -
Record in the EP mode and play back with the same VCR.
1) Play back the recorded section in the slow mode.
2) Observing the monitor screen, move noise to the top of the screen.

- SP Adjustment -
Record in the SP mode and play back with the same VCR.
1) Play back the recorded section in the slow mode.
2) Observing the monitor screen, move noise to the top of the screen.

2. VIDEO CIRCUIT ADJUSTMENTS

1. E-E Level Adjustment

Purpose of adjustment and fault occurring if incomplete

Purpose: Set the luminance level to the specified value in the E-E mode.

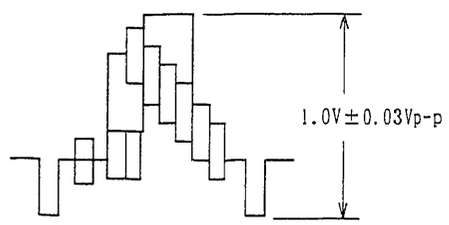
Fault: The brightness is different between the input and output signals.

Test Equipment/Jigs	Test Equipment Connection Points	VCR State	Adjustment Point
· Color bar generator · Oscilloscope (200mV/div., 10μs/div.)	· VIDEO IN · VIDEO OUT	· Apply a color bar signal and set the VCR to the E-E mode.	· RT208 (E-E LEVEL)

Adjustment Procedure

1) Adjust RT208 so that the color bar level is 1.0Vp-p±0.03Vp-p. (75Ω Terminated)

Waveforms



2. White Clip Level Adjustment

Purpose of adjustment and fault occurring if incomplete

Purpose:

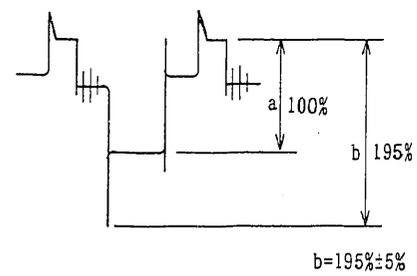
Fault:

Test Equipment/Jigs	Test Equipment Connection Points	VCR State	Adjustment Point
· Oscilloscope (200mV/div., 10μs/div.) · Color bar generator	· CH-1: TP203 · VIDEO IN	· Apply a color bar signal and set the VCR to the E-E mode.	· RT203 (WHITE CLIP LEVEL)

Adjustment Procedure

1) Adjust RT203 so the relationship between levels (a) and (b) is obtained as shown in the diagram on the right.

Waveforms



3. FM Carrier and Deviation Adjustment

Purpose of adjustment and fault occurring if incomplete

Purpose: Sets the FM carrier frequency and deviation to the specified values.

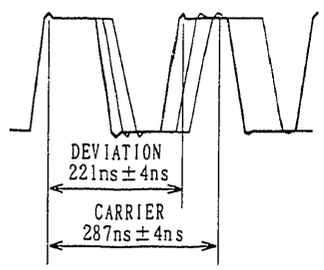
Fault: The picture is distorted when tapes recorded by other VCRs are played by this VCR and compatibility is not obtained.

Test Equipment/Jigs	Test Equipment Connection Points	VCR State	Adjustment Points
· Color bar generator · Oscilloscope · Blank tape	· VIDEO IN · TP201	· Receive a white(100%) signal (line input) · REC mode · EP mode	· RT202 (Carrier Frequency) · RT204 (FM Deviation)

Adjustment Procedure

1) Connect an oscilloscope to TP201.
2) Set the scope to (+) and adjust RT202 so the period of the widest pulse is 287ns±4ns.
3) Set the scope to (+) and adjust RT204 so the period of the narrowest pulse is 221ns±4ns.

Waveforms



4. Playback Level Adjustemnt

Purpose of adjustment and fault occurring if incomplete

Purpose: To set the playback level to the specified value.

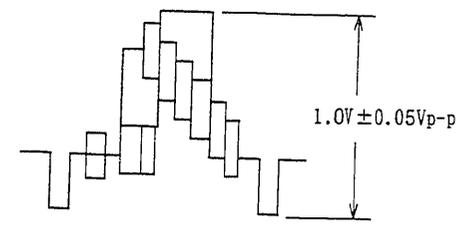
Fault: The brightness of the picture during playback is different from that during recording.

Test Equipment/Jigs	Test Equipment Connection Points	VCR State	Adjustment Point
· Color bar generator · Oscilloscope · Blank tape	· VIDEO IN · VIDEO OUT	· Receive a color bar signal (line input) · REC mode · SP mode	· RT206 (PLAYBACK LEVEL)

Adjustment Procedure

1) Play back the recorded signal and adjust RT206 so that the color bar level is 1.0Vp-p±0.05Vp-p. (75Ω Terminated)

Waveforms



5. Record Chroma Level Adjustment

Purpose of adjustment and fault occurring if incomplete

Purpose: To set the record chroma level to the optimum value.

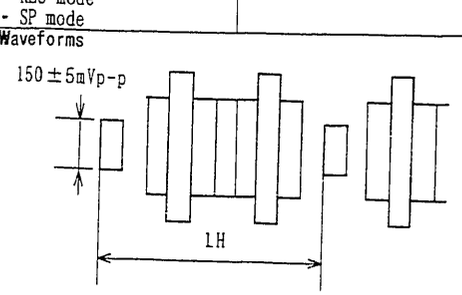
Fault: Beats may occur or the color may become poor.

Test Equipment/Jigs	Test Equipment Connection Points	VCR State	Adjustment Point
· Color bar generator · Oscilloscope · Blank tape	· VIDEO IN · PG201 PIN2	· Receive a color bar signal (Line input) · REC mode · SP mode	· RT201 (REC CHROMA LEVEL)

Adjustment Procedure

1) Adjust RT201 so that the color burst level is 150±5mVp-p.

Waveforms



3. AUDIO CIRCUIT ADJUSTMENT

1. Audio Bias Level Adjustment

Purpose of adjustment and fault occurring if incomplete

Purpose: To set the recording bias to the optimum level.

Fault: · Bias too high : High-frequency response deteriorates.
· Bias too low : Sound tends to be distorted.

Test Equipment/Jigs	Test Equipment Connection Points	VCR State	Adjustment Point
· VTVM	· TP401 (REC BIAS) · TP402 (BIAS GROUND)	· No-signal record mode (SP mode)	· RT401 (AUDIO BIAS LEVEL)

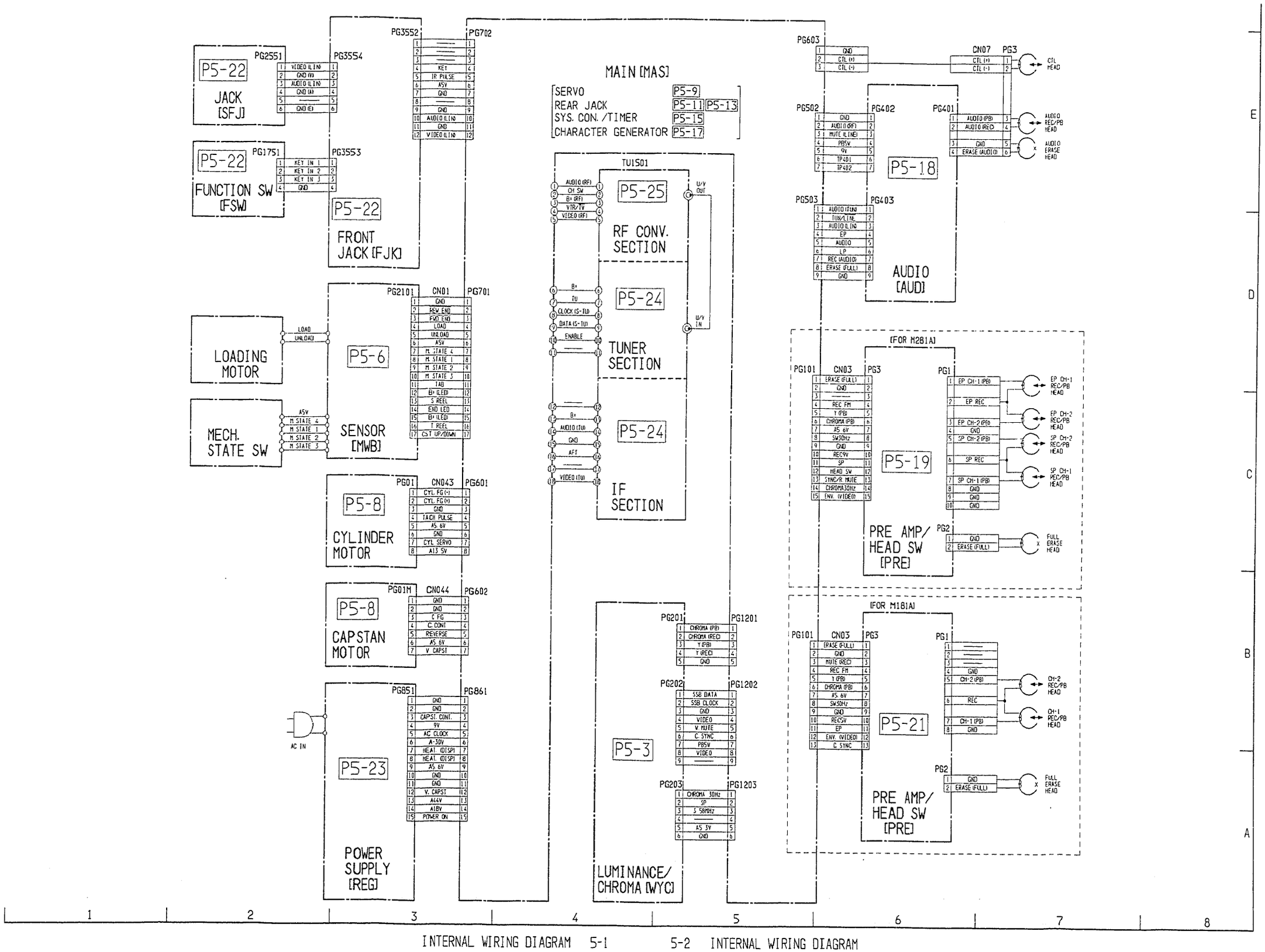
Adjustment Procedure

1) RT401 : Set the reading of the VTVM to 2.8mV±0.1mVrms.

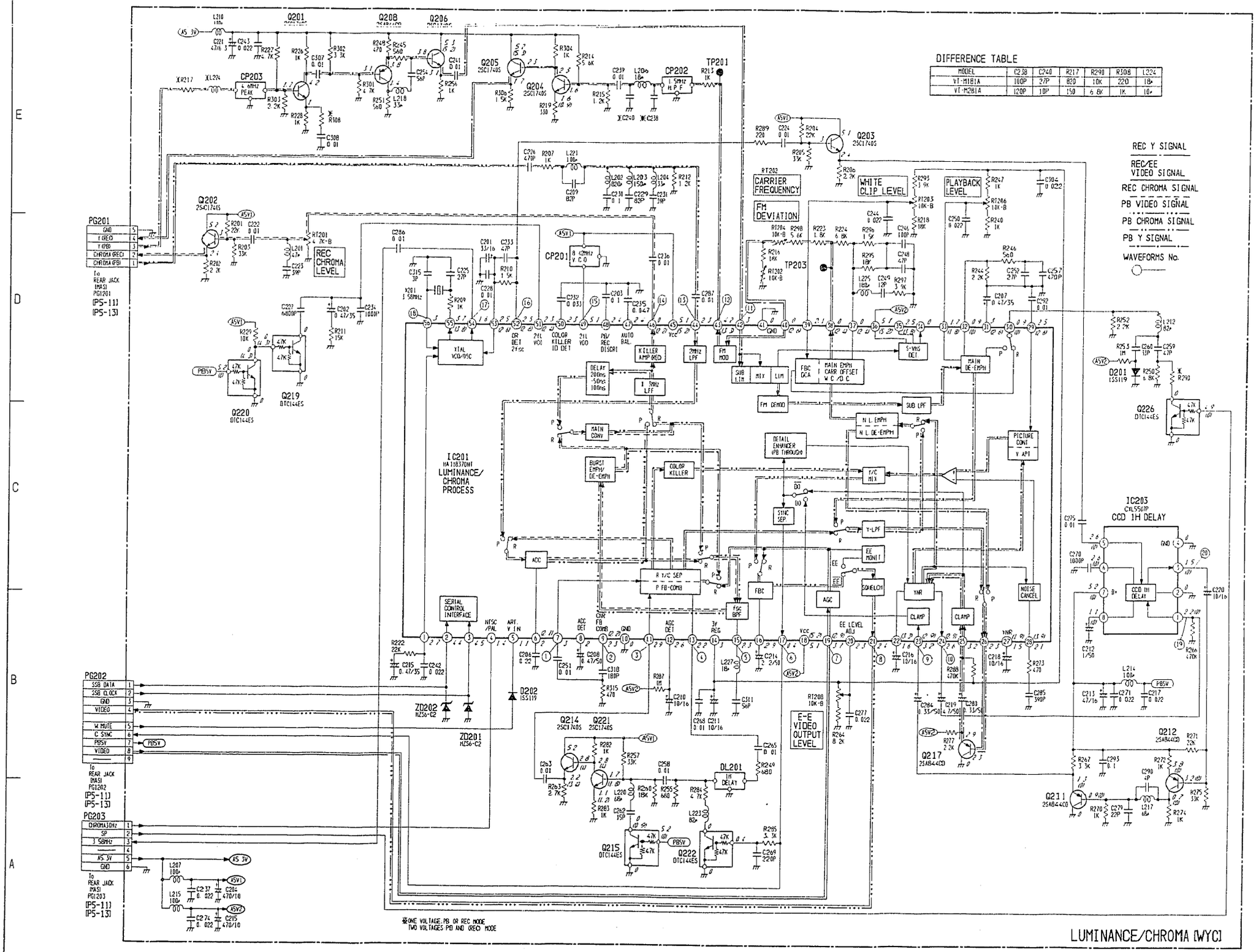
SCHEMATIC & CIRCUIT BOARD DIAGRAMS

MODELS : VT-M181A/M281A

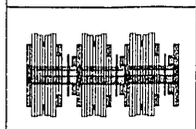
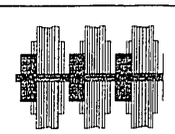
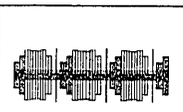
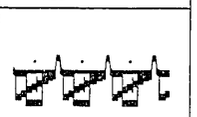
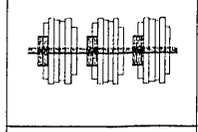
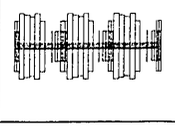
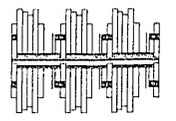
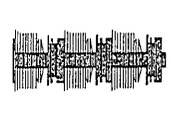
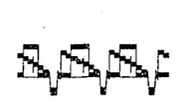
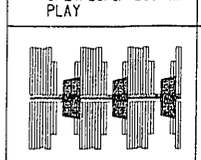
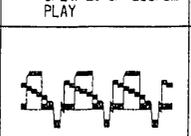
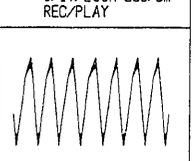
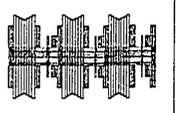
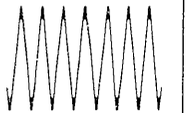
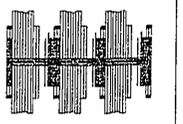
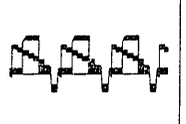
INTERNAL WIRING DIAGRAM



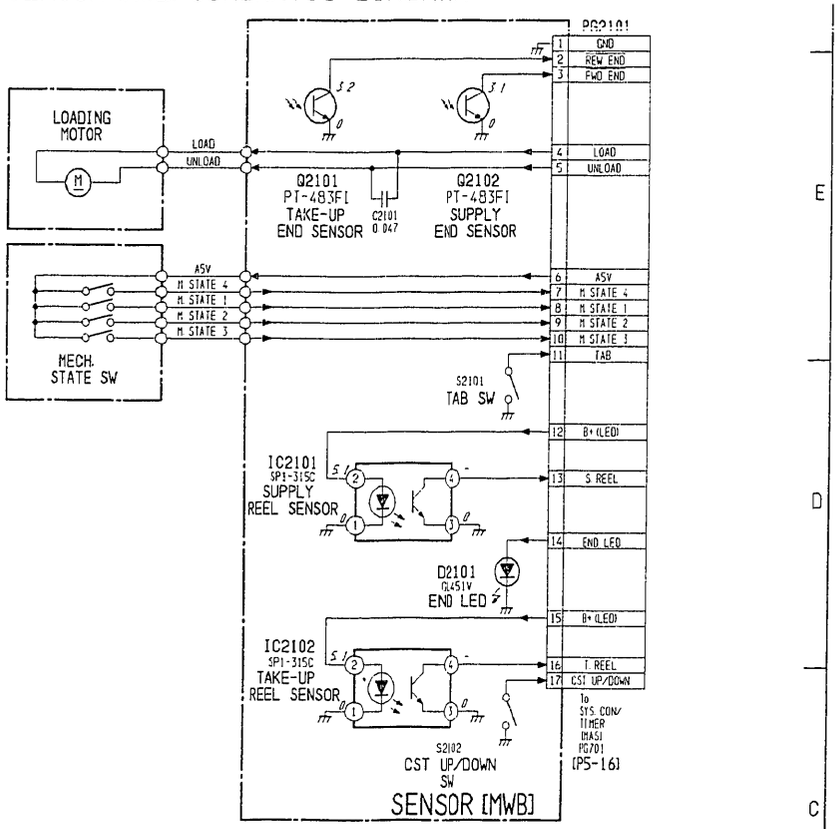
LUMINANCE/CHROMA (WYC) SCHEMATIC DIAGRAM



LUMINANCE/CHROMA WAVEFORMS

1-A IC201-7 280mVp-p 50mV/20.0μ sec. cm REC	4-B IC201-13 1.2Vp-p 0.2V/20.0μ sec. cm PLAY	9-A IC201-23 300mVp-p 0.1V/20.0μ sec. cm REC	14-A IC201-46 350mVp-p 0.1V/20.0μ sec. cm REC	20-A IC203-3 650mVp-p 0.2V/20.0μ sec. cm REC
				
1-B IC201-7 890mVp-p 0.2V/20.0μ sec. cm PLAY	5-A IC201-15 440Vp-p 0.1V/20.0μ sec. cm REC	9-B IC201-23 370mVp-p 0.1V/20.0μ sec. cm PLAY	15-A IC201-49 940mVp-p 0.2V/100nsec. cm REC/PLAY	20-B IC203-3 800mVp-p 0.2V/20.0μ sec. cm PLAY
				
2-A IC201-9 320mVp-p 50mV/20.0μ sec. cm REC	5-B IC201-15 320mVp-p 50mV/20.0μ sec. cm PLAY	10-A IC201-24 560mVp-p 0.2V/20.0μ sec. cm REC	16-A IC201-52 330mVp-p 0.1V/100n sec. cm REC/PLAY	
				
2-B IC201-9 1.1Vp-p 0.2V/20.0μ sec. cm PLAY	6-A IC201-17 5.4Vp-p 1V/20.0μ sec. cm REC/PLAY	10-B IC201-24 720mVp-p 0.2V/20.0μ sec. cm PLAY	17-A IC201-54 500mVp-p 0.1V/200n sec. cm REC/PLAY	
				
3-A IC201-11 120mVp-p 20mV/20.0μ sec. cm REC	7-A IC201-19 890mVp-p 0.2V/20.0μ sec. cm REC/PLAY	11-B IC201-42 460mVp-p 0.2V/5.0m sec. cm PLAY	18-A IC201-56 580mVp-p 0.1V/200n sec. cm REC/PLAY	
				
3-B IC201-11 250mVp-p 50mV/20.0μ sec. cm PLAY	8-A IC201-21 1.9Vp-p 0.5V/20.0μ sec. cm REC	12-A IC201-43 800mVp-p 0.2V/5.0m sec. cm REC	19-A IC203-1 590mVp-p 0.2V/20.0μ sec. cm REC	
4-A IC201-13 540mVp-p 0.1V/20.0μ sec. cm REC	8-B IC201-21 2.5Vp-p 0.5V/20.0μ sec. cm PLAY	13-B IC201-44 170mVp-p 50mV/20.0μ sec. cm PLAY	19-B IC203-1 700mVp-p 0.2V/20.0μ sec. cm PLAY	
				

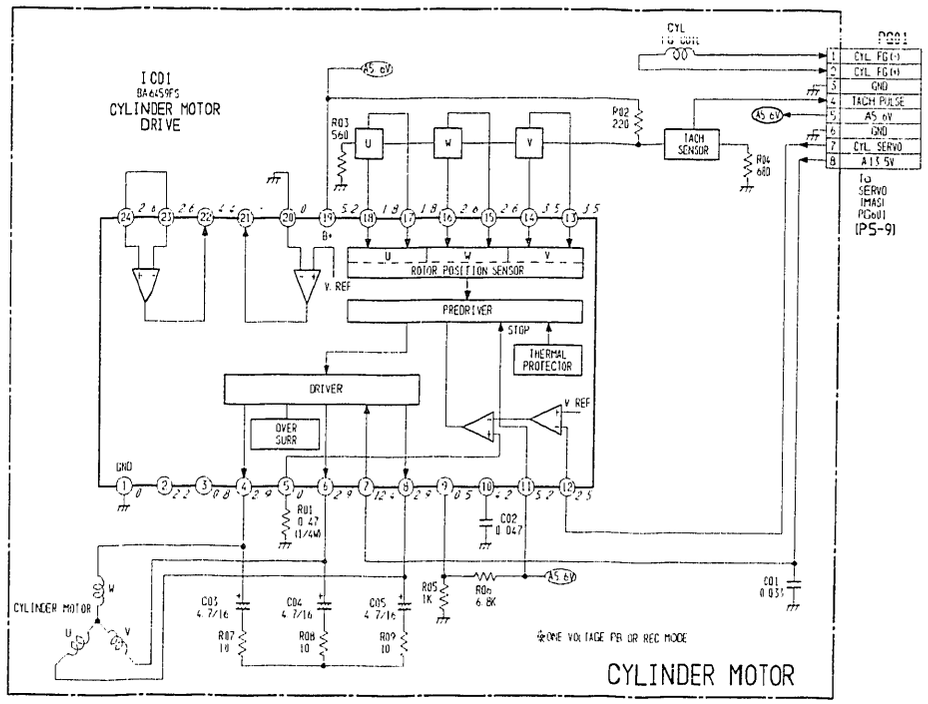
SENSOR (MWB) SCHEMATIC DIAGRAM



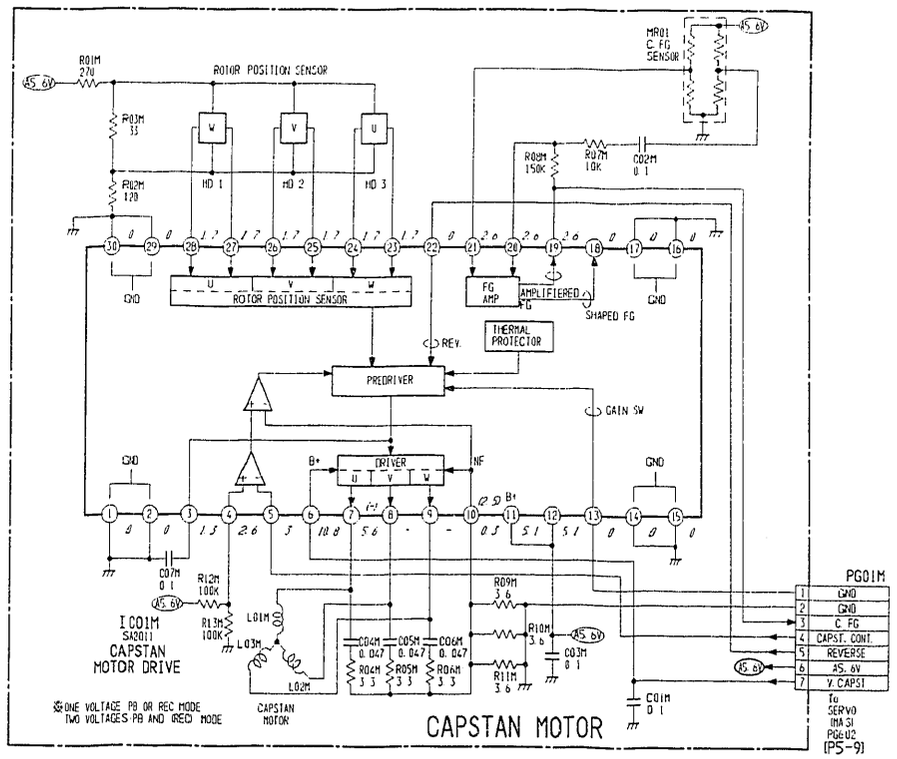
SERVO WAVEFROMS

51-A IC601-5 2.7Vp-p 0.5V/2.0msec. cm REC/PLAY	55-A IC601-30 5.9Vp-p 1V/10.0msec. cm REC	57-B IC601-35 2.4Vp-p 0.5V/5.0msec. cm PLAY	60-A IC601-42 520mVp-p 0.5V/5.0msec. cm REC/PLAY	63-A IC601-49 3.9Vp-p 1V/20.0msec. cm REC/PLAY
52-A IC601-6 2.3Vp-p 0.5V/10.0msec. cm REC/PLAY	56-A IC601-34 32mVp-p 20mV/20.0msec. cm REC	58-B IC601-36 2.4Vp-p 0.5V/5.0msec. cm PLAY	61-A IC601-44 27mVp-p 20mV/10.0msec. cm REC	64-A IC601-53 5.5Vp-p 1V/10.0msec. cm REC/PLAY
53-A IC601-8 3.4Vp-p 1V/1.0msec. cm REC/PLAY	56-B IC601-34 2.4Vp-p 0.5V/5.0msec. cm PLAY	59-A IC601-40 5.4Vp-p 1V/10.0msec. cm REC	61-B IC601-44 5.6Vp-p 1V/10.0msec. cm PLAY	65-A IC601-54 5.5Vp-p 1V/100.0sec. cm REC/PLAY
54-A IC601-29 5.9Vp-p 1V/10.0msec. cm REC	57-A IC601-35 34mVp-p 20mV/20.0msec. cm REC	59-B IC601-40 5.4Vp-p 1V/10.0msec. cm PLAY	62-A IC601-45 5.6Vp-p 1V/10.0msec. cm REC/PLAY	

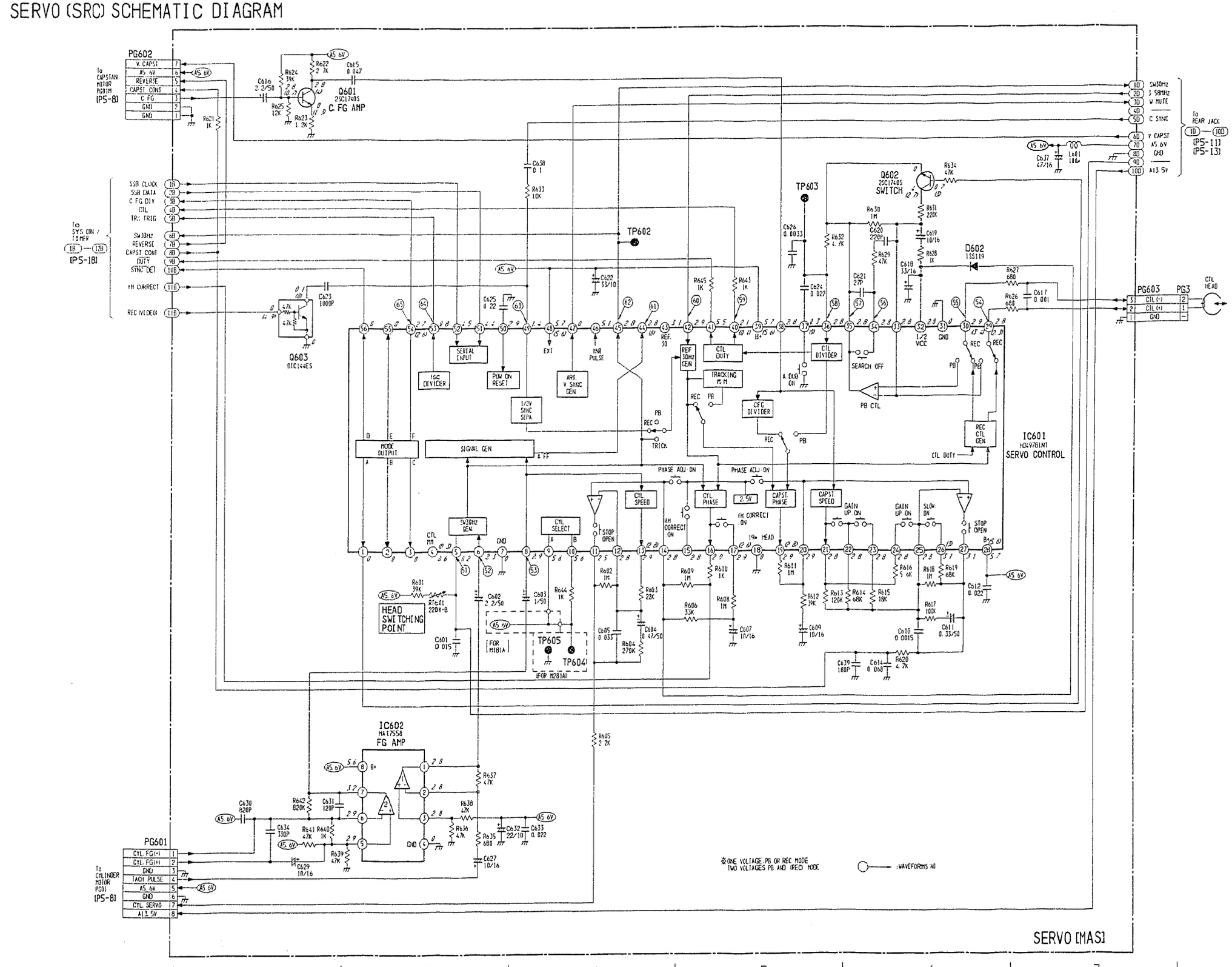
CYL. MOTOR SCHEMATIC DIAGRAM



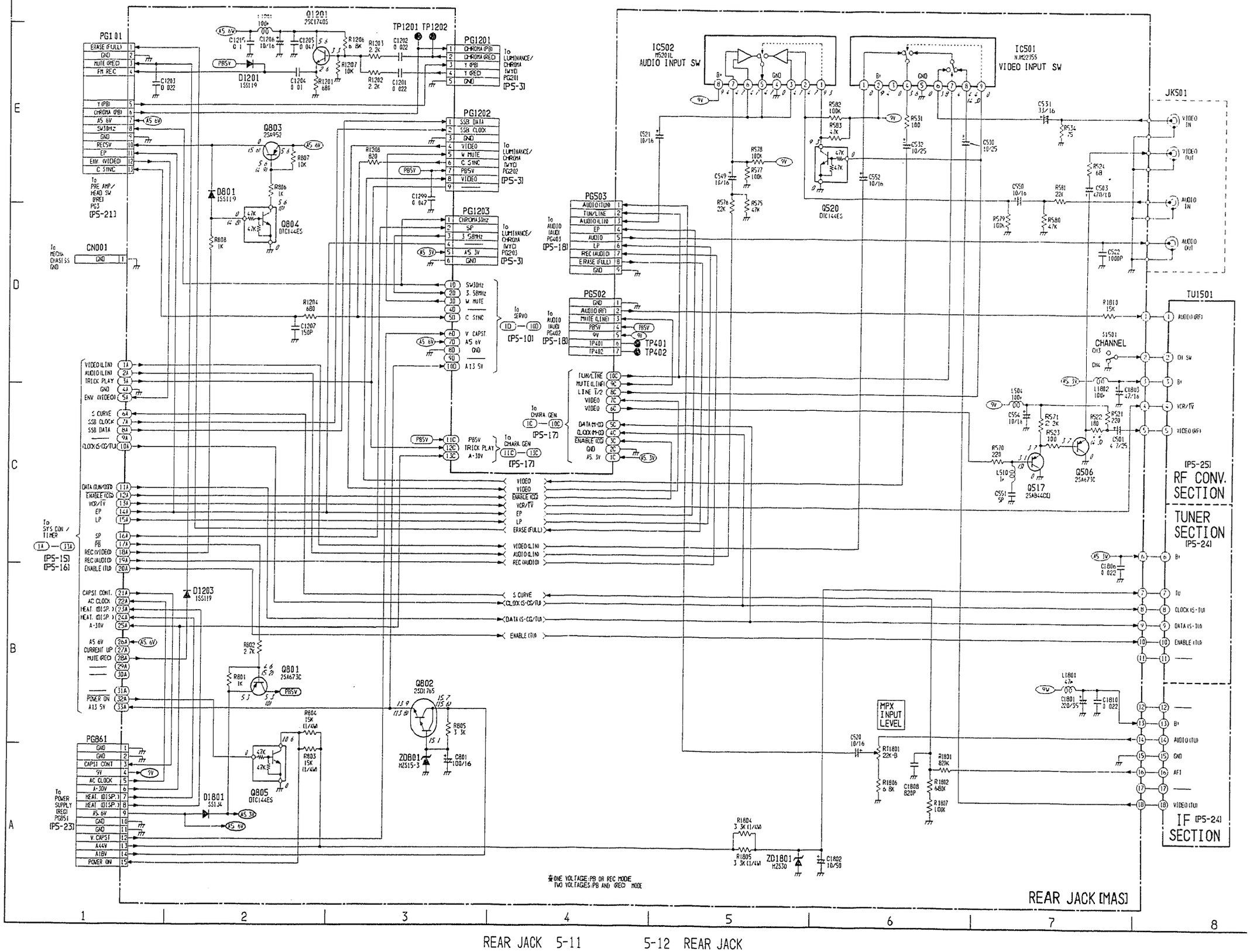
CAPSTAN MOTOR SCHEMATIC DIAGRAM



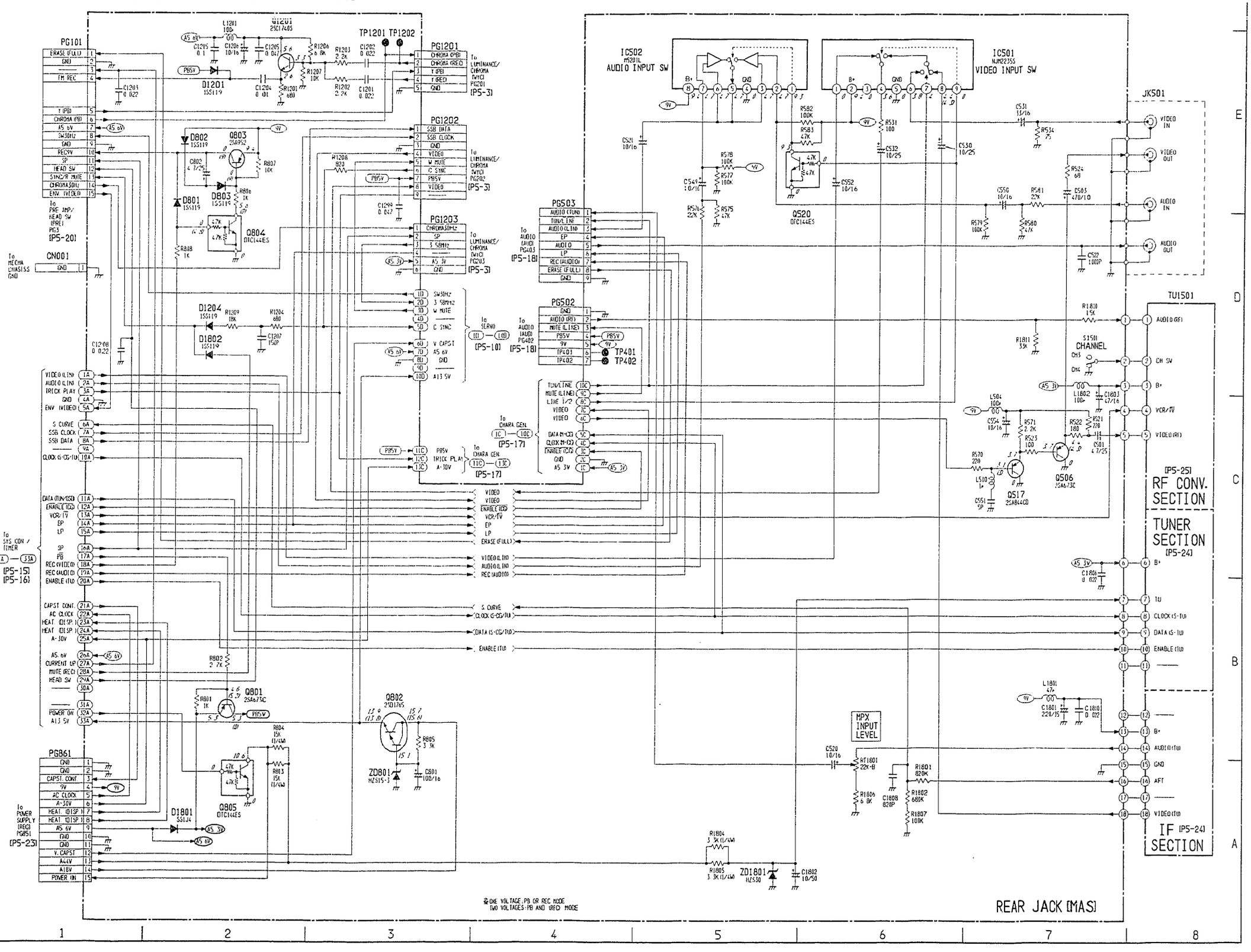
SERVO (SRC) SCHEMATIC DIAGRAM



REAR JACK (MAS) SCHEMATIC DIAGRAM (VT-M181A)

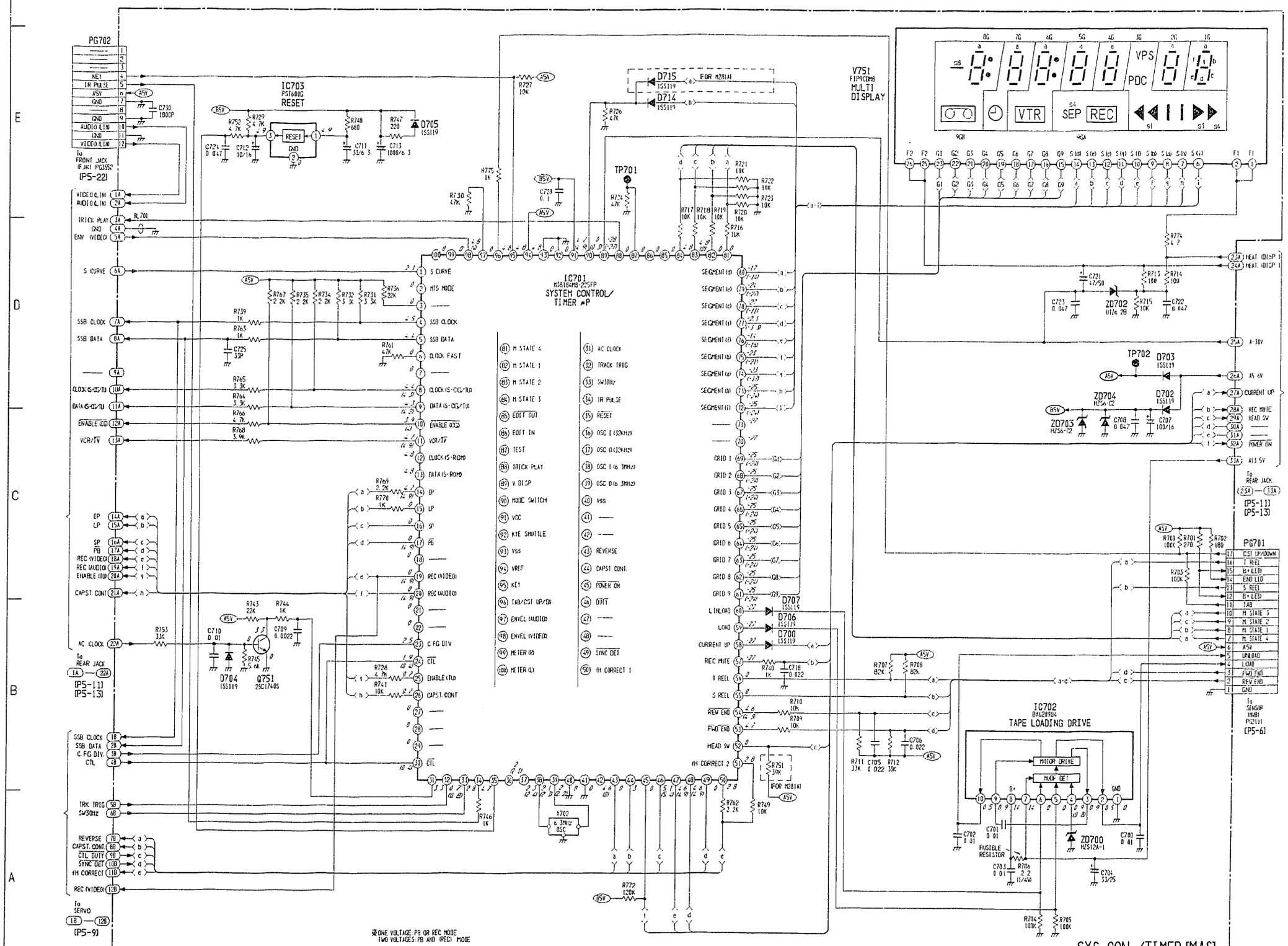


REAR JACK (MAS) SCHEMATIC DIAGRAM (VT-M281A)

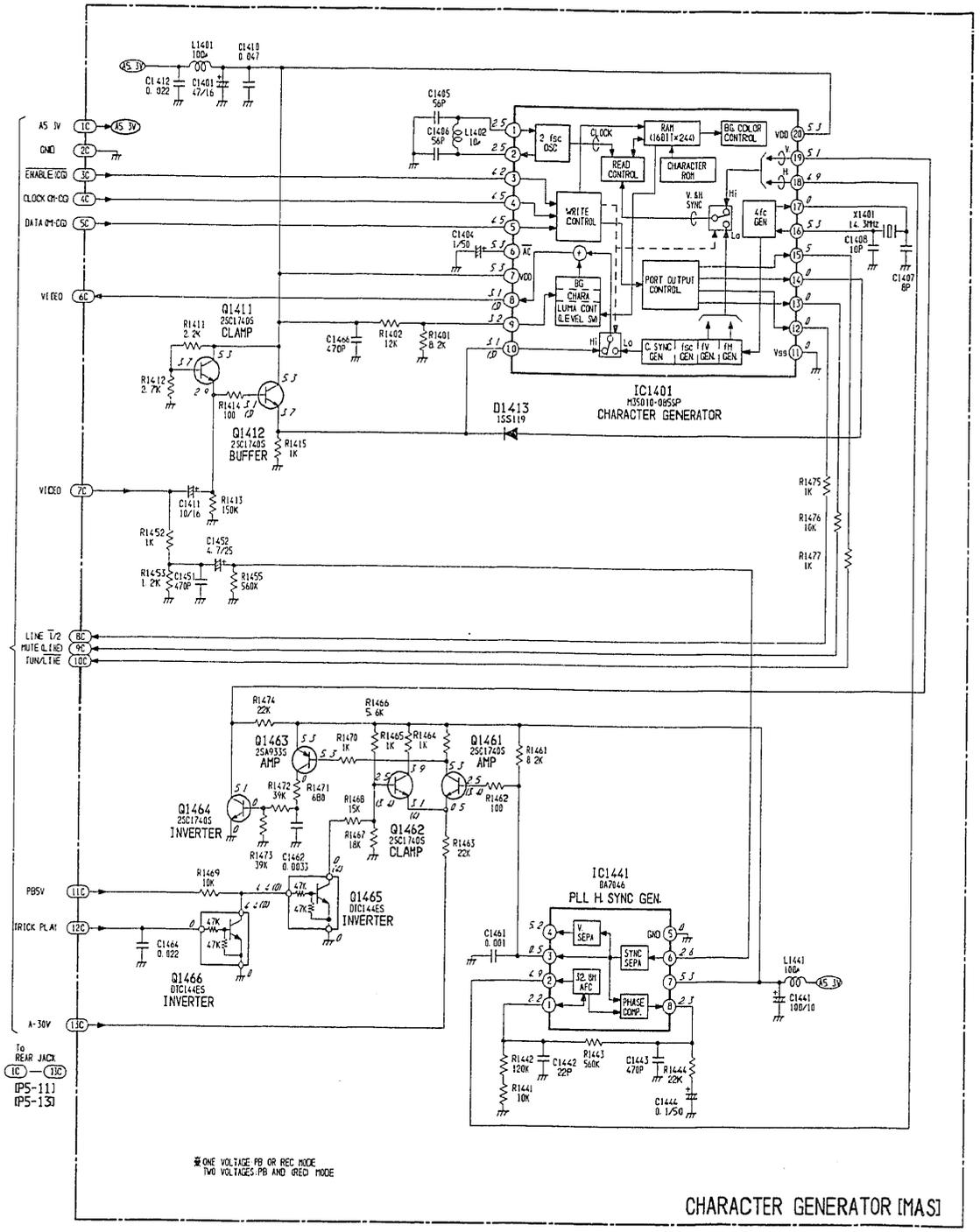


REAR JACK 5-13 5-14 REAR JACK

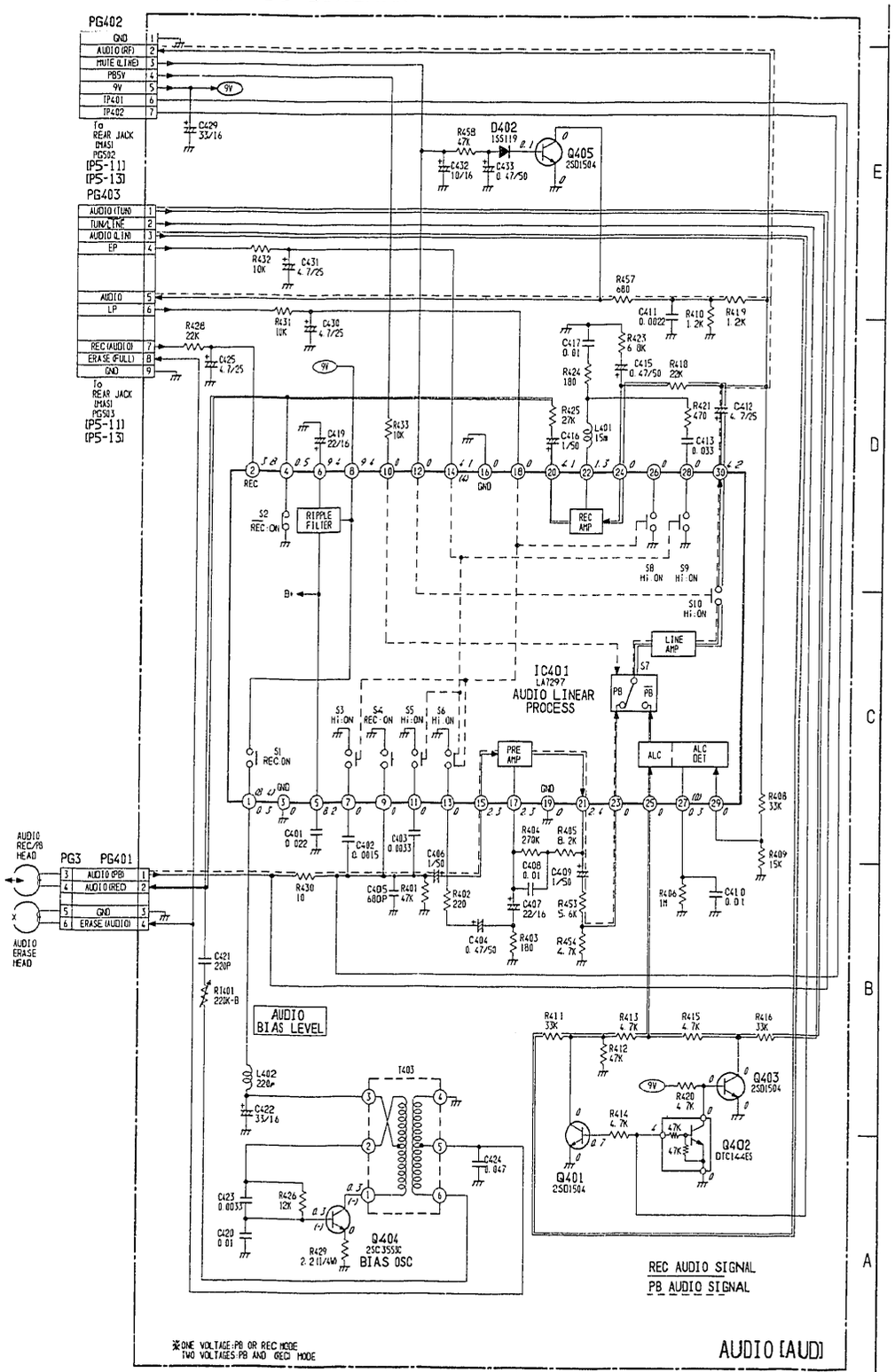
SYS. CON. /TIMER (MAS) SCHEMATIC DIAGRAM



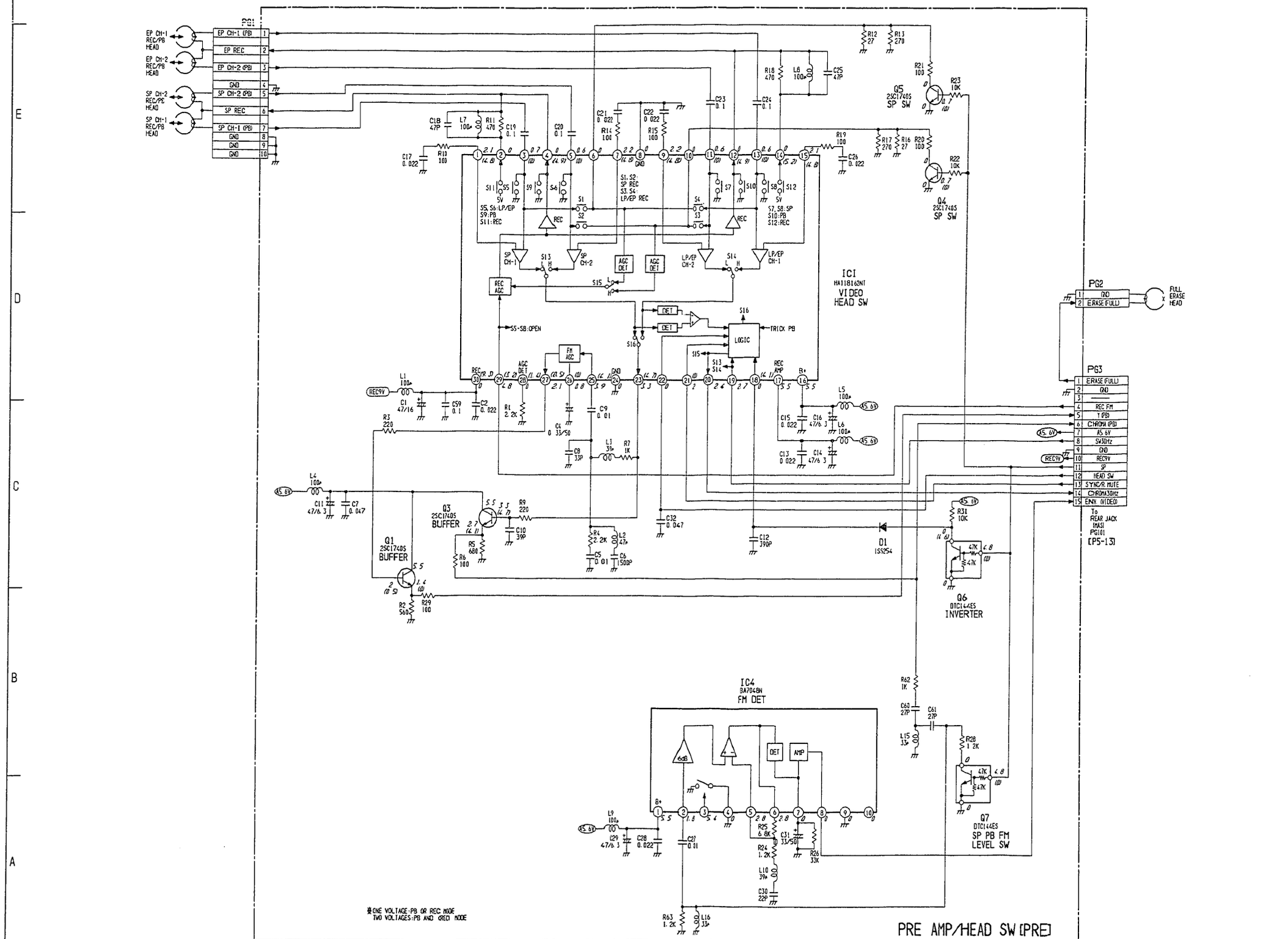
CHARACTER GENERATOR (MAS) SCHEMATIC DIAGRAM



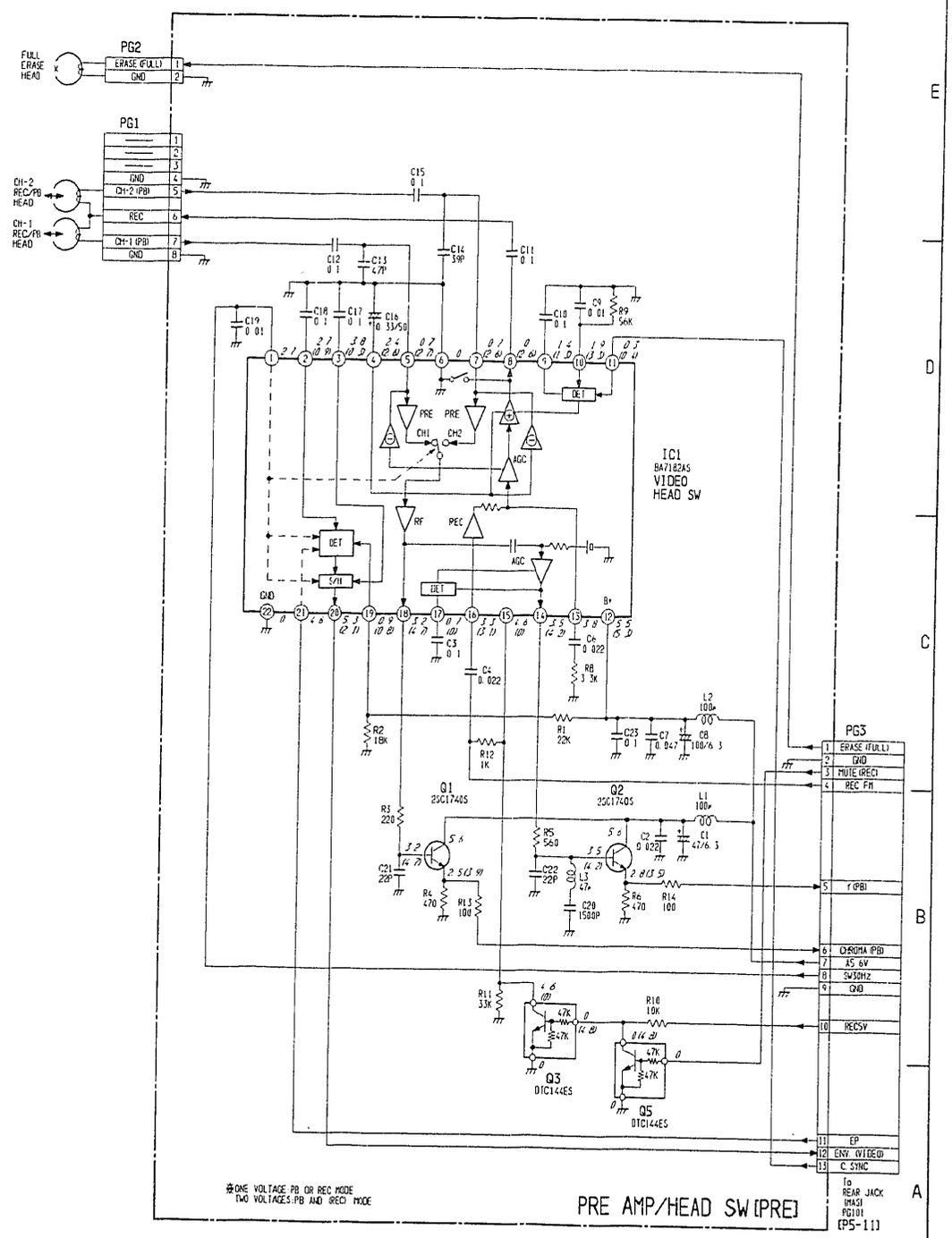
AUDIO (AUD) SCHEMATIC DIAGRAM



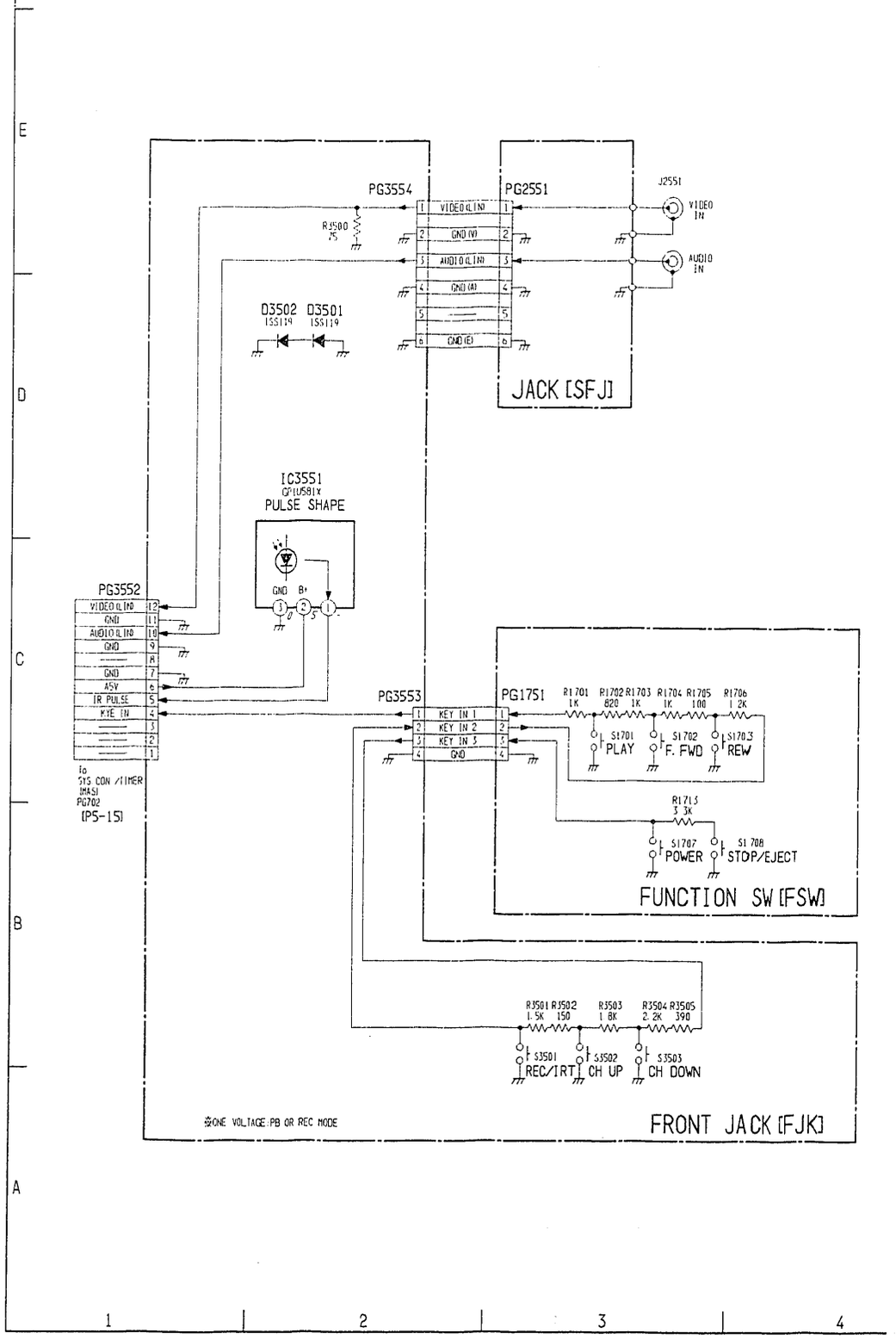
PRE AMP/HEAD SW (PRE) SCHEMATIC DIAGRAM (VT-M281A)



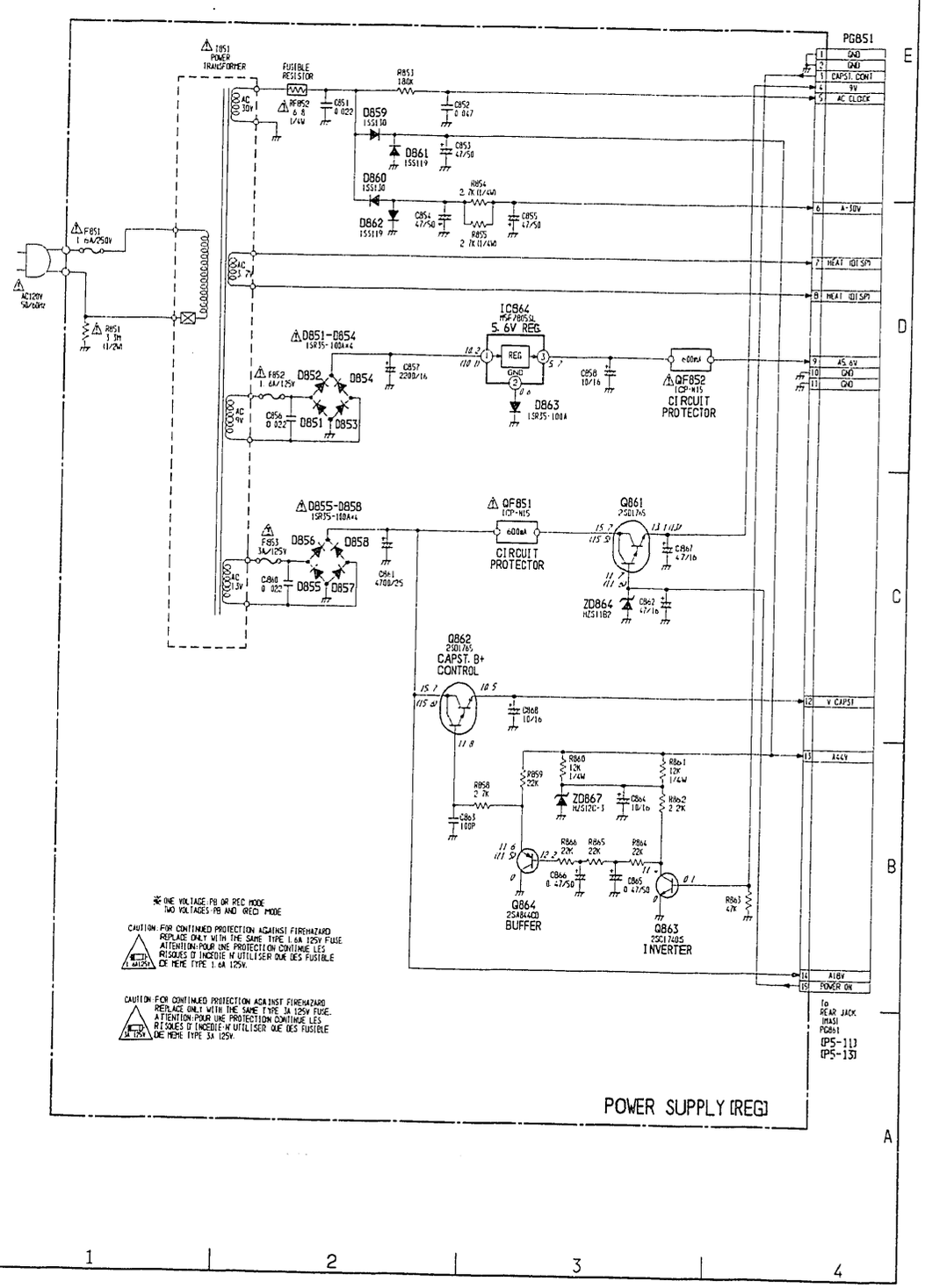
PRE AMP/HEAD SW (PRE) SCHEMATIC DIAGRAM (VT-M181A)



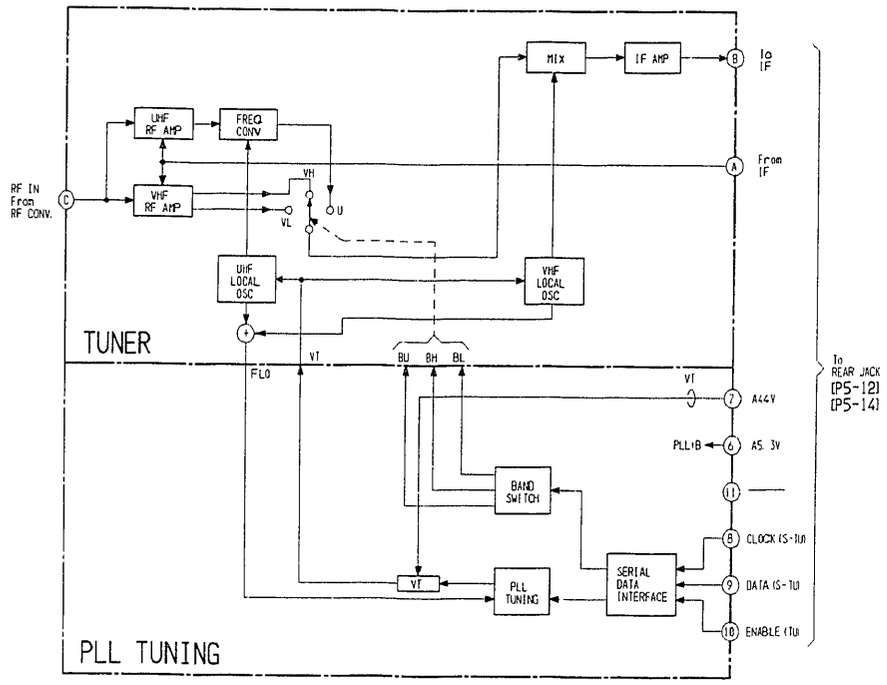
FRONT JACK (FJK) . FUNCTION SW (FSW) . JACK (SFJ) SCHEMATIC DIAGRAMS



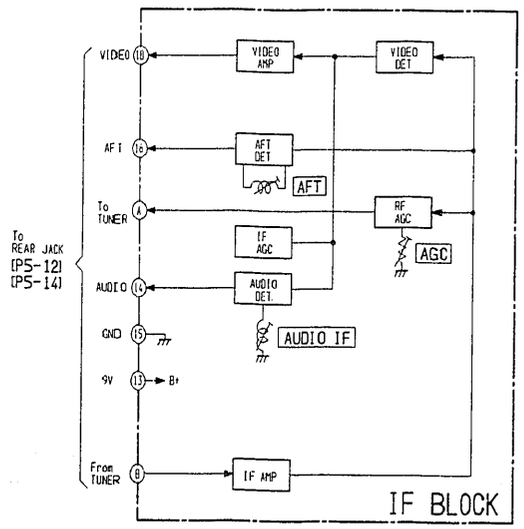
POWER SUPPLY (REG) SCHEMATIC DIAGRAM



TUNER BLOCK DIAGRAM

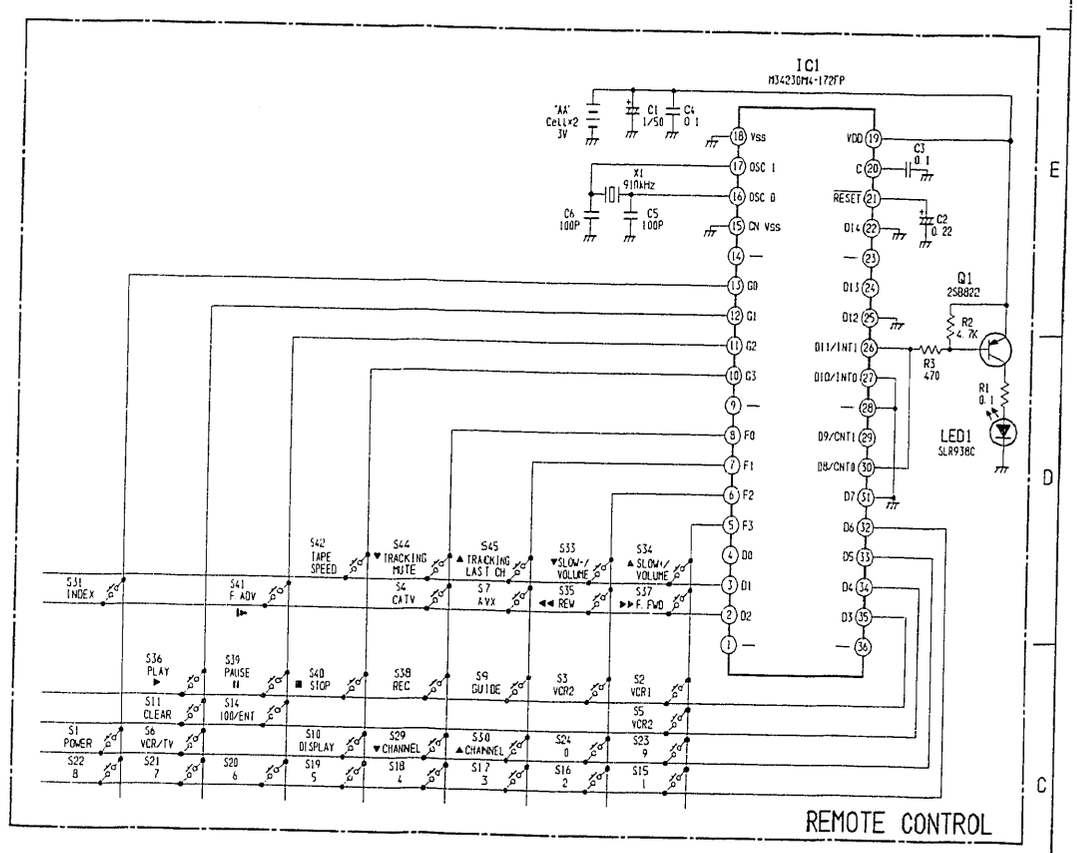


IF BLOCK DIAGRAM

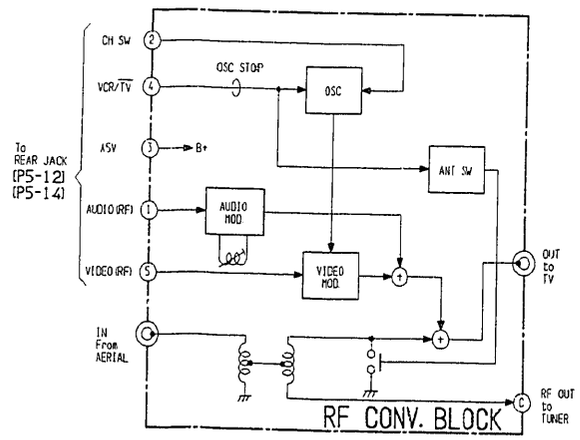


5-24 TUNER. IF

REMOTE CONTROL SCHEMATIC DIAGRAM



RF CONVERTER BLOCK DIAGRAM



REMOTE CONTROL. RF CONVERTER 5-25

IDENTIFICATION OF PARTS LOCATION

MAS (MAIN)

Symbol No.	Parts Location
BL	
BL701	9D
C	
C501	1C
C503	2C
C520	4C
C521	2A
C522	2D
C530	2D
C531	2C
C532	2C
C549	1A
C550	1A
C551	1C
C552	2C
C554	1C
C601	6B
C602	4A
C603	4B
C604	6A
C605	6B
C607	7A
C609	7B
C610	7B
C611	7B
C612	7B
C614	7C
C615	6C
C616	6C
C617	7C
C618	7C
C619	7C
C620	6C
C621	7C
C622	6C
C623	5C
C624	6C
C625	5C
C626	6C
C627	3A
C629	3A
C630	3A
C631	4B
C632	3A
C633	3A
C634	3B
C637	5C
C638	5C
C639	7C
C700	9D
C701	8D
C702	8D
C703	8D
C704	8D
C705	7D
C706	8D
C707	9D
C708	10B
C709	8B
C710	8B
C711	8C
C712	8C
C713	8D
C718	8D
C721	10D
C722	10D
C723	10D
C724	8C
C725	6A
C728	10D
C730	9A
C801	6D
C802	3E
C1201	8A
C1202	8A
C1203	4E
C1204	8A
C1205	8A
C1206	8B
C1207	3E
C1208	4E
C1215	4E
C1299	5A
C1401	1E
C1404	1E
C1405	1E
C1406	1E
C1407	2D
C1408	1D
C1410	1D
C1411	1E
C1412	1E
C1441	2E
C1442	2F
C1443	2E
C1444	2E
C1451	2E
C1452	2E
C1461	2E
C1462	3E
C1464	2D
C1466	1E
C1801	3C
C1802	2C
C1803	1A
C1806	2B
C1808	3A
C1810	2C
D	
D602	7C
D700	9C
D702	10D
D703	9D
D704	8B
D705	8C
D706	9C
D707	9C
D714	10B
D715	10B
D801	3E
D802	3E
D803	3E
D1201	3E
D1203	4E
D1204	3F
D1413	1D
D1801	5E
D1802	4E
IC	
IC501	2C
IC502	1A
IC601	6B
IC602	4A
IC701	9C
IC702	9D
IC703	8C
IC1401	1D
IC1441	2E
JK	
JK501	1D
L	
L504	1C
L510	1C
L601	6C
L1201	7A
L1401	1F
L1402	1E
L1441	2E
L1801	2C
L1802	2B
PG	
PG101	4F
PG502	3C
PG503	5C
PG601	4B
PG602	7C
PG603	6C
PG701	7D
PG702	10A
PG861	5D
PG1201	8A
PG1202	6A
PG1203	5A
Q	
Q506	2C
Q517	1C
Q520	2A
Q601	6C
Q602	7C
Q603	5C
Q751	8B
Q801	2B
Q802	6D
Q803	3E
Q804	3E
Q805	5E
Q1201	8B
Q1411	1E
Q1412	1D
Q1461	2E
Q1462	2E
Q1463	2E
Q1464	3D
Q1465	3E
Q1466	2D
R	
R521	1C
R522	1C
R523	2C
R524	2C
R531	2C
R534	2C
R570	1C
R571	1C
R575	1A
R576	1A
R577	1A
R578	1B
R579	1A
R580	1A
R581	1A
R582	2A
R583	2A
R601	6B
R602	6B
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R606	6B
R608	7B
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R617	7B
R618	7C
R619	7C
R620	7C
R621	7C
R622	6C
R623	6C
R624	6C
R625	6C
R626	7C
R627	6C
R628	7C
R629	6C
R630	7C
R631	7C
R632	6C
R633	5C
R634	7C
R635	3A
R636	4A
R637	3A
R638	3A
R639	4A
R640	3A
R641	3A
R642	4B
R643	8C
R644	6B
R645	5C
R700	8D
R701	7D
R702	7D
R703	7D
R704	9D
R705	9D
R706	8D
R707	8E
R708	8D
R709	9D
R710	9C
R711	8D
R712	8D
R713	10D
R714	10D
R715	10D
R716	10A
R717	9A
R718	10A
R719	10A
R720	9A
R721	9A
R722	9A
R723	9A
R724	10B
R726	10C
R727	10B
R728	8B
R729	8C
R730	9B
R731	9B
R732	9B
R734	9B
R735	9B
R736	9B
R739	9A
R740	9C
R741	6D
R743	8B
R744	8C
R745	8B
R746	9B
R747	8C
R748	8C
R749	9C
R751	8D
R752	8C
R753	7C
R761	9A
R762	9C
R763	9A
R764	8A
R765	8A
R766	4D
R767	9B
R768	8A
R769	8B
R770	8B
R772	9D
R774	10E
R775	7D
R801	2B
R802	3C
R803	5E
R804	5D
R805	6D
R806	3E
R807	3E
R808	3E
R1201	8A
R1202	8A
R1203	8A
R1204	4D
R1206	8B
R1207	8A
R1208	6A
R1209	3E
R1401	1E
R1402	1D
R1411	1E
R1412	1E
R1413	1E
R1414	1E
R1415	1D
R1441	2F
R1442	2F
R1443	2E
R1444	2E
R1452	2E
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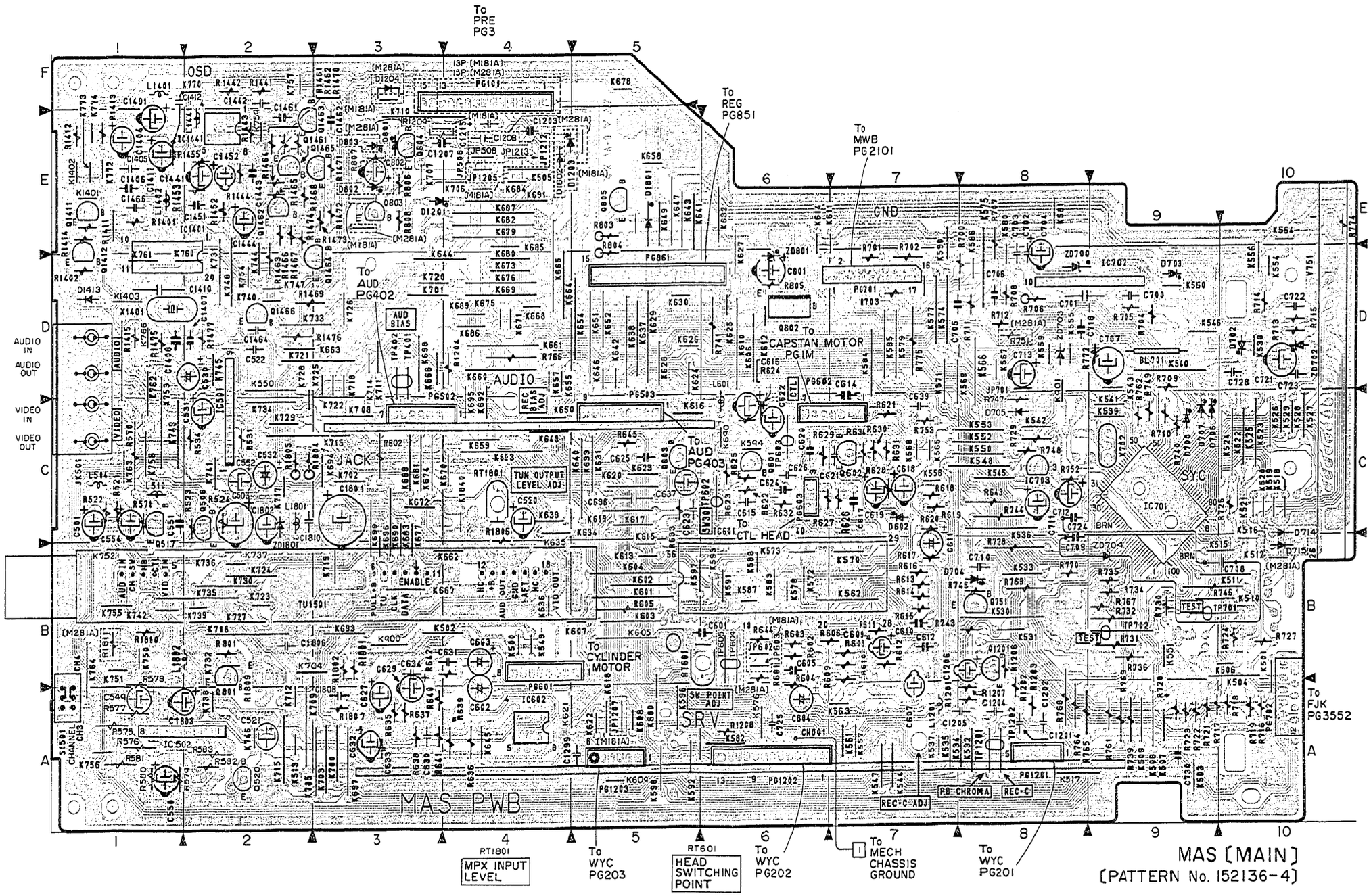
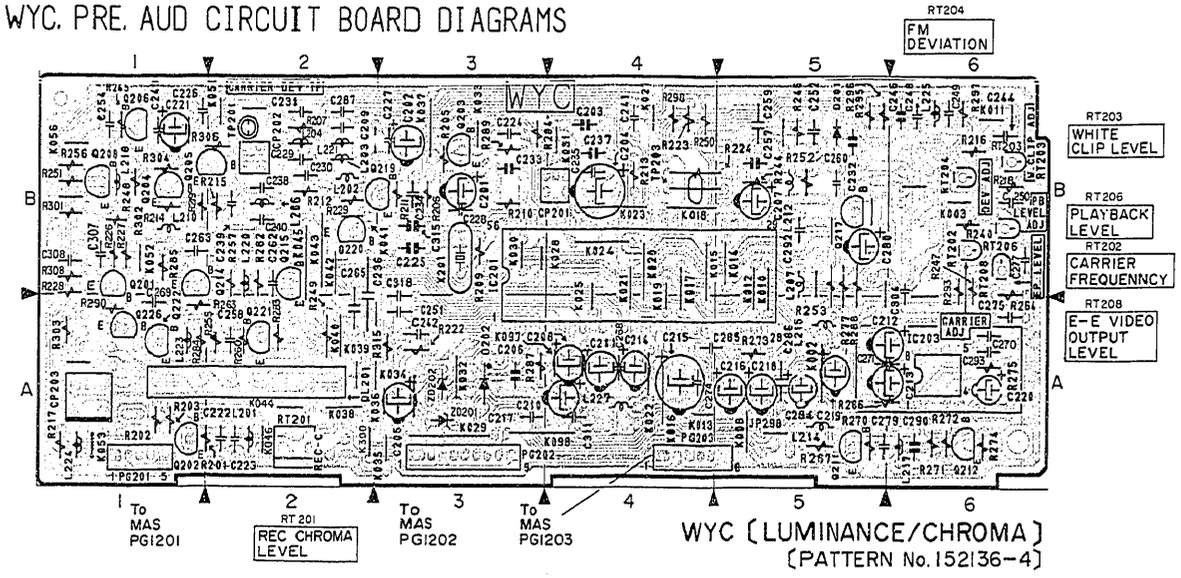
R1461	2E
R1462	2E
R1463	2D
R1464	2E
R1465	2E
R1466	2E
R1467	2E
R1468	2E
R1469	2D
R1470	2E
R1471	3E
R1472	3E
R1473	3E
R1474	2E
R1475	1D
R1476	2D
R1477	2D
R1801	3B
R1802	3B
R1804	2C
R1805	2C
R1806	4C
R1807	3A
R1810	1B
R1811	1B
RT	
RT601	6B
RT1801	4C
S	
S1501	1A
TP	
TP401	3D
TP402	3D
TP602	6C
TP603	6C
TP604	6B
TP605	6B
TP701	9B
TP702	9B
TP1201	8A
TP1202	8A
TU	
TU1501	2B
V	
V751	10D
X	
X702	9C
X1401	1D
ZD	
ZD700	8D
ZD702	10D
ZD703	8D
ZD704	9B
ZD801	6D
ZD1801	2C

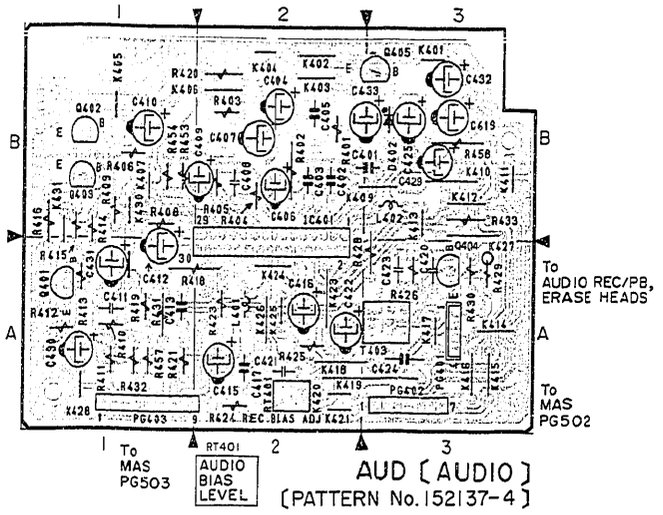
MAS CIRCUIT BOARD DIAGRAM



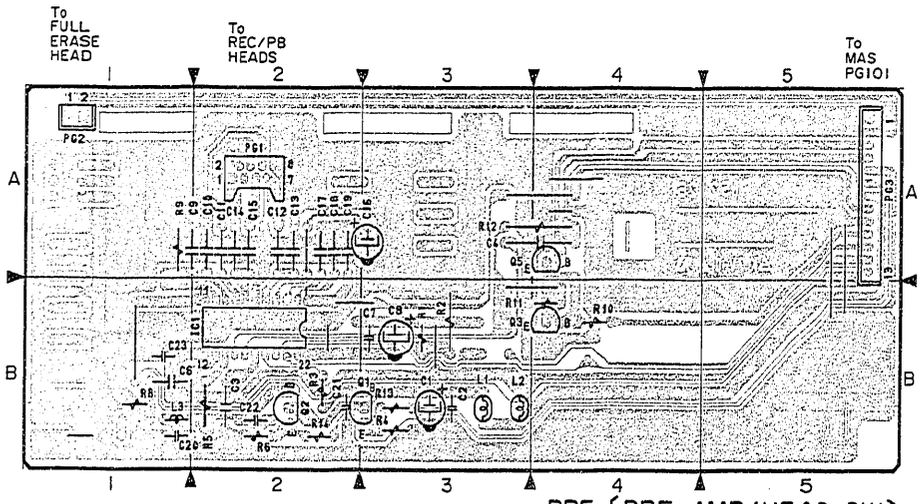
WYC. PRE. AUD CIRCUIT BOARD DIAGRAMS



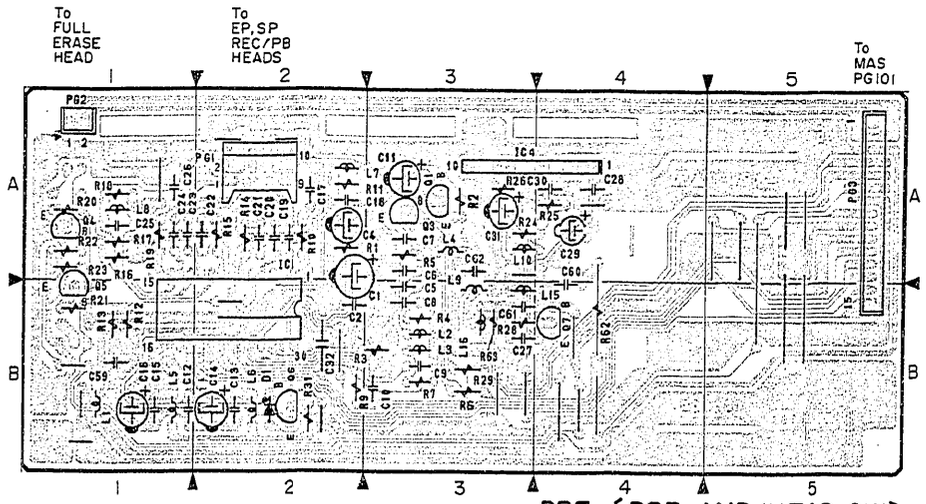
WYC [LUMINANCE/CHROMA]
[PATTERN No.152136-4]



AUD [AUDIO]
[PATTERN No.152137-4]



PRE [PRE AMP/HEAD SW]
(VT-M181A)
[PATTERN No.152126-5]



PRE [PRE AMP/HEAD SW]
(VT-M281A)
[PATTERN No.152095-6]

IDENTIFICATION OF PARTS LOCATION

PRE [PRE AMP/HEAD SW]
(VT-M181A)

Symbol No.	C	C1	C2	C3	C4	C6	C7	C8	C9	C10	C11	C12	C13	C14	C15	C16
Parts Location		3B	3B	2B	4A	1B	3B	3B	1A	2A	2A	2A	2A	2A	2A	3A

Symbol No.	C17	C18	C19	C20	C21	C22	C23	IC	IC1	L	L1	L2	L3	PG	PG1	PG2
Parts Location	2A	2A	2A	1B	2B	2B	1B		2B		3B	3B	1B		2A	1A

Symbol No.	PG3	Q	Q1	Q2	Q3	Q5	R	R1	R2	R3	R4	R5	R6	R8	R9	R10
Parts Location	5A		3B	2B	4B	4A		3B	3B	2B	3B	2B	2B	1B	1A	4B

Symbol No.	R11	R12	R13	R14
Parts Location	4B	4A	3B	2B

PRE [PRE AMP/HEAD SW]
(VT-M281A)

Symbol No.	C	C1	C2	C4	C5	C6	C7	C8	C9	C10	C11	C12	C13	C14	C15	C16
Parts Location		2A	2B	2A	3B	3A	3A	3B	3B	3B	3A	1B	2B	2B	1B	1B

Symbol No.	C17	C18	C19	C20	C21	C22	C23	C24	C25	C26	C27	C28	C29	C30	C31	C32
Parts Location	2A	2A	2A	2A	2A	2A	1A	1A	1A	1A	3B	4A	4A	4A	3A	2B

Symbol No.	C59	C60	C61	C62	D	D1	IC	IC1	IC4	L	L1	L2	L3	L4	L5	L6
Parts Location	1B	4B	3B	3A		2B		2B	3A		3B	3B	3B	3A	1B	2B

Symbol No.	L7	L8	L9	L10	L15	L16	PG	PG1	PG2	PG3	Q	Q1	Q3	Q4	Q5	Q6
Parts Location	2A	1A	3B	3A	3B	3B		2A	1A	5A		3A	3A	1A	1B	1B

Symbol No.	Q7	R	R1	R2	R3	R4	R5	R6	R7	R9	R10	R11	R12	R13	R14	R15
Parts Location	4B		2A	3A	3B	3B	3A	3B	3B	2B	2A	2A	1B	1B	2A	2A

Symbol No.	R16	R17	R18	R19	R20	R21	R22	R23	R24	R25	R26	R28	R29	R31	R62	R63
Parts Location	1A	1A	1A	1A	1A	1B	1A	1A	3A	4A	3A	3B	3B	2B	4B	3B

IDENTIFICATION OF PARTS LOCATION

WYC (LUMINANCE/CHROMA)

Symbol No.	Parts Location
C	
C201	3B
C202	3B
C203	4B
C204	4B
C205	3A
C206	3A
C207	5B
C208	4A
C209	2B
C210	4A
C211	4A
C212	5A
C213	5A
C214	4A
C215	4A
C216	5A
C217	3A
C218	5A
C219	5A
C220	6A
C221	1B
C222	2A
C223	2A
C224	3B
C225	3B
C226	1B
C227	3B
C228	3B
C229	2B
C230	2B
C231	2B
C232	5B
C233	3B
C234	3B
C235	4B
C236	2A
C237	4B
C238	2B
C239	2B
C240	2B
C241	4B
C242	3A
C243	1B
C244	6B
C246	6B
C248	6B
C249	6B
C250	6B
C251	3A
C252	5B
C254	1B
C257	5B
C258	2A
C259	5B
C260	5B
C262	2B
C263	1B
C265	2A
C268	4A
C269	1A
C270	6A
C271	5A
C274	4A
C275	6A
C277	6B
C279	5A
C280	5B
C284	5A
C285	4A
C286	5A
C287	2B
C290	6A
C292	5B
C293	6A
C304	6B
C307	1B
C308	1B
C311	4A
C315	3B
C318	3A
CP	
CP201	4B
CP202	2B
CP203	1A
D	
D201	5B
D202	3A
DL	
DL201	2A
IC	
IC201	4B
IC203	6A
L	
L201	2A
L202	2B
L203	2B
L204	2B
L206	2B
L207	5B
L210	1B
L212	5B
L214	5A
L215	5A
L217	6A
L218	1B
L220	2B
L221	2B
L223	1A
L224	1A
L225	6B
L227	4A
PG	
PG201	1A
PG202	3A
PG203	4A
Q	
Q201	1B
Q202	1A
Q203	3B
Q204	1B
Q205	1B
Q206	1B
Q208	1B
Q211	5A
Q212	6A
Q214	1B
Q215	2B
Q217	5B
Q219	3B
Q220	2B
Q221	2A
Q222	1A
Q226	1A
R	
R201	2A
R202	1A
R203	1A
R204	3B
R205	3B
R206	3B
R207	2B
R209	3B
R210	3B
R211	3B
R212	2B
R213	4B
R214	1B
R215	2B
R216	6B
R217	1A
R218	6B
R219	1B
R222	3A
R223	4B
R224	4B
R226	1B
R227	1B
R228	1B
R229	2B
R240	6B
R244	5B
R245	1B
R246	5B
R247	6B
R248	1B
R249	2A
R250	4B
R251	1B
R252	5B
R253	5B
R255	2A
R256	1B
R257	2B
R260	2A
R263	1A
R264	6B
R266	5A
R267	5A
R270	5A
R271	6A
R272	6A
R273	5A
R274	6A
R275	6A
R277	5B
R282	2B
R283	2A
R284	1A
R285	1B
R287	3A
R288	5B
R289	3B
R290	1A
R293	6B
R295	5B
R296	5B
R297	6B
R298	4B
R301	1B
R302	1B
R303	1A
R304	1B
R306	2B
R308	1B
R315	3A
RT	
RT201	2A
RT202	6B
RT203	6B
RT204	6B
RT205	6B
RT208	6B
TP	
TP201	2B
TP203	4B
X	
X201	3B
ZD	
ZD201	3A
ZD202	3A

AUD (AUDIO)

Symbol No.	Parts Location
C	
C401	3B
C402	2B
C403	2B
C404	2B
C405	2B
C406	2B
C407	2B
C408	2B
C409	2B
C410	1B
C411	1A
C412	1A
C413	1A
C415	2A
C416	2A
C417	2A
C419	3B
C420	3A
C421	2A
C422	2A
C423	3A
C424	3A
C425	3B
C429	3B
C430	1A
C431	1A
C432	3B
C433	2B
D	
D402	3B
IC	
IC401	2B
L	
L401	2A
L402	3B
PG	
PG401	3A
PG402	3A
PG403	1A
Q	
Q401	1A
Q402	1B
Q403	1B
Q404	3A
Q405	3B
R	
R401	2B
R402	2B
R403	2B
R404	2B
R405	2B
R406	1B
R408	1B
R409	1B
R410	1A
R411	1A
R412	1A
R413	1A
R414	1B
R415	1B
R416	1B
R418	2A
R419	1A
R420	2B
R421	1A
R423	2A
R424	2A
R425	2A
R426	3A
R428	3A
R429	3A
R430	3A
R431	1A
R432	1A
R433	3B
R453	1B
R454	1B
R457	1A
R458	3B
RT	
RT401	2A
T	
T403	3A

IDENTIFICATION OF PARTS LOCATION

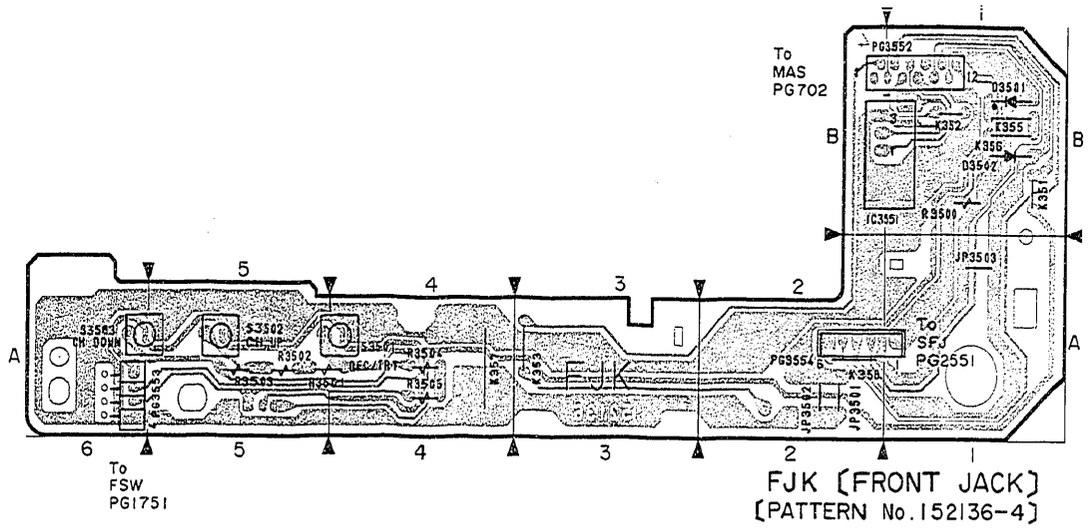
FJK (FRONT JACK)

Symbol No.	Parts Location
D	
D3501	1B
D3502	1B
IC	
IC3551	1B
PG	
PG3552	1B
PG3553	6A
PG3554	2A
R	
R3500	1B
R3501	5A
R3502	5A
R3503	5A
R3504	4A
R3505	4A
S	
S3501	4A
S3502	5A
S3503	6A

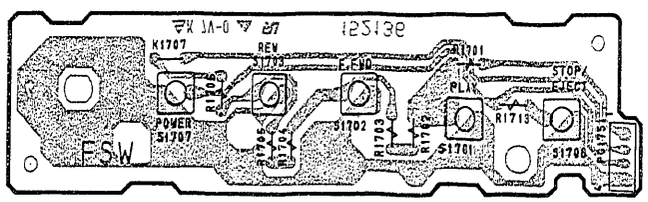
REG (POWER SUPPLY)

Symbol No.	Parts Location
C	
C851	3B
C852	4C
C853	3B
C854	3B
C855	3C
C856	3B
C857	3B
C858	4A
C860	3A
C861	3A
C862	4A
C863	4B
C864	4B
C865	4B
C866	4B
C867	4A
C868	4B
D	
D851	3B
D852	3B
D853	3B
D854	3B
D855	3A
D856	3A
D857	3A
D858	3A
D859	3B
D860	3B
D861	3B
D862	3B
D863	4A
FU	
FU851	1B
FU852	2C
FU853	1C
IC	
IC864	5B
PG	
PG851	5B
Q	
Q861	5A
Q862	4B
Q863	4B
Q864	4B
QF	
QF851	4A
R	
R851	2A
R853	3C
R854	4C
R855	3C
R858	4B
R859	4B
R860	4B
R861	4B
R862	4B
R863	4A
R864	4B
R865	4B
R866	4B
RF	
RF852	3B
T	
T851	2A
ZD	
ZD864	4A
ZD867	4B

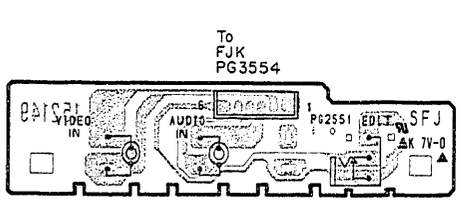
FJK. FSW. SFJ. REG. MWB CIRCUIT BOARD DIAGRAMS



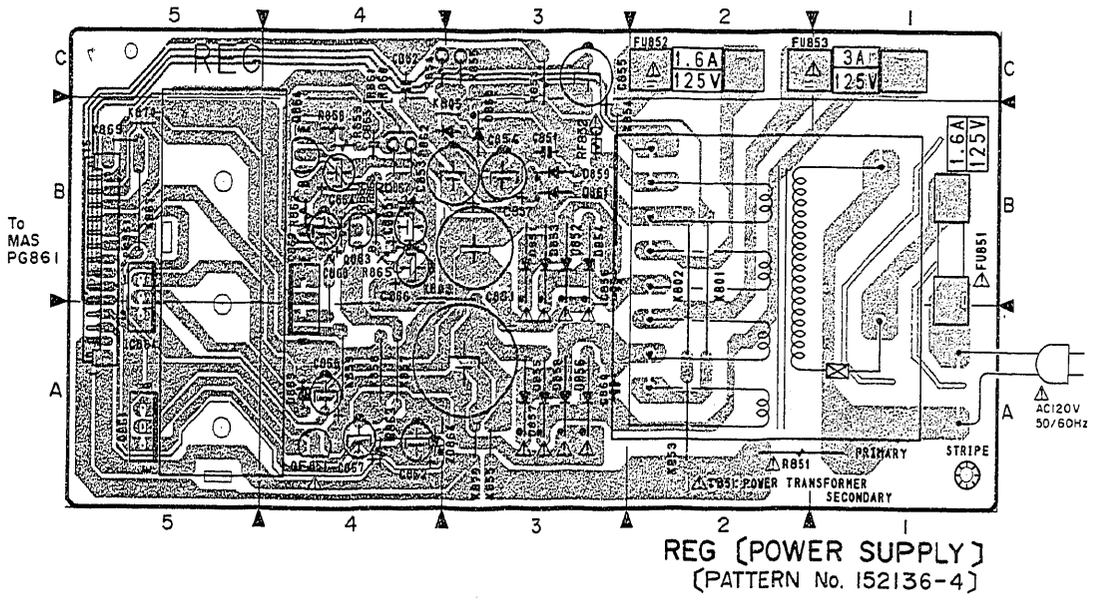
FJK [FRONT JACK]
[PATTERN No.152136-4]



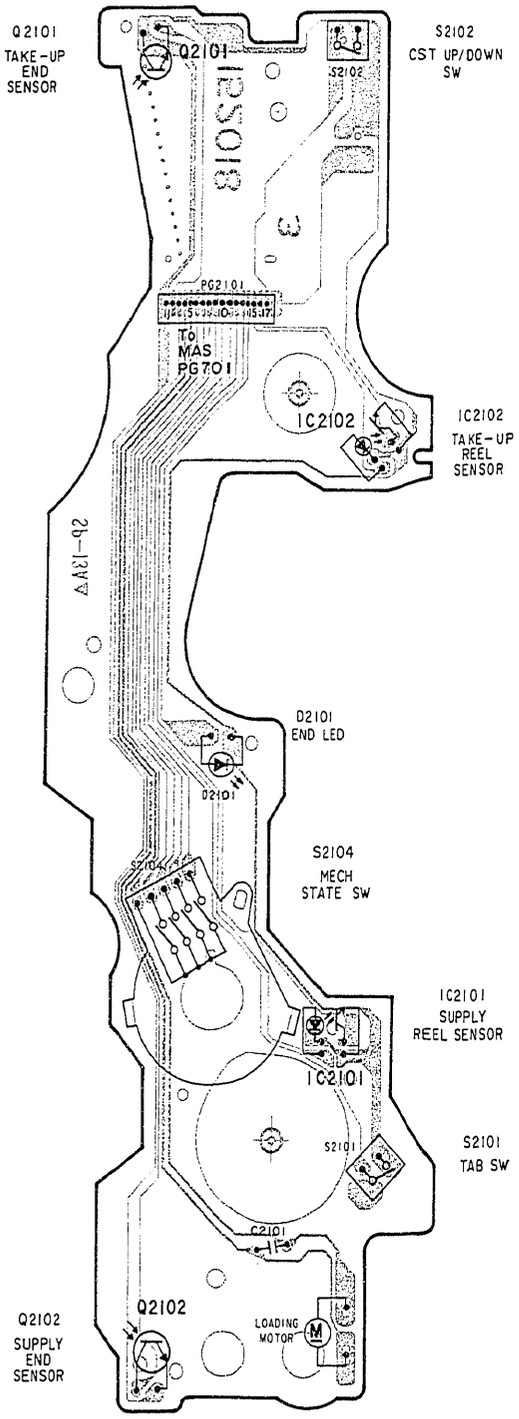
FSW [FUNCTION SW]
[PATTERN No.152136-4]



SFJ [JACK]
[PATTERN No. 152149-1]



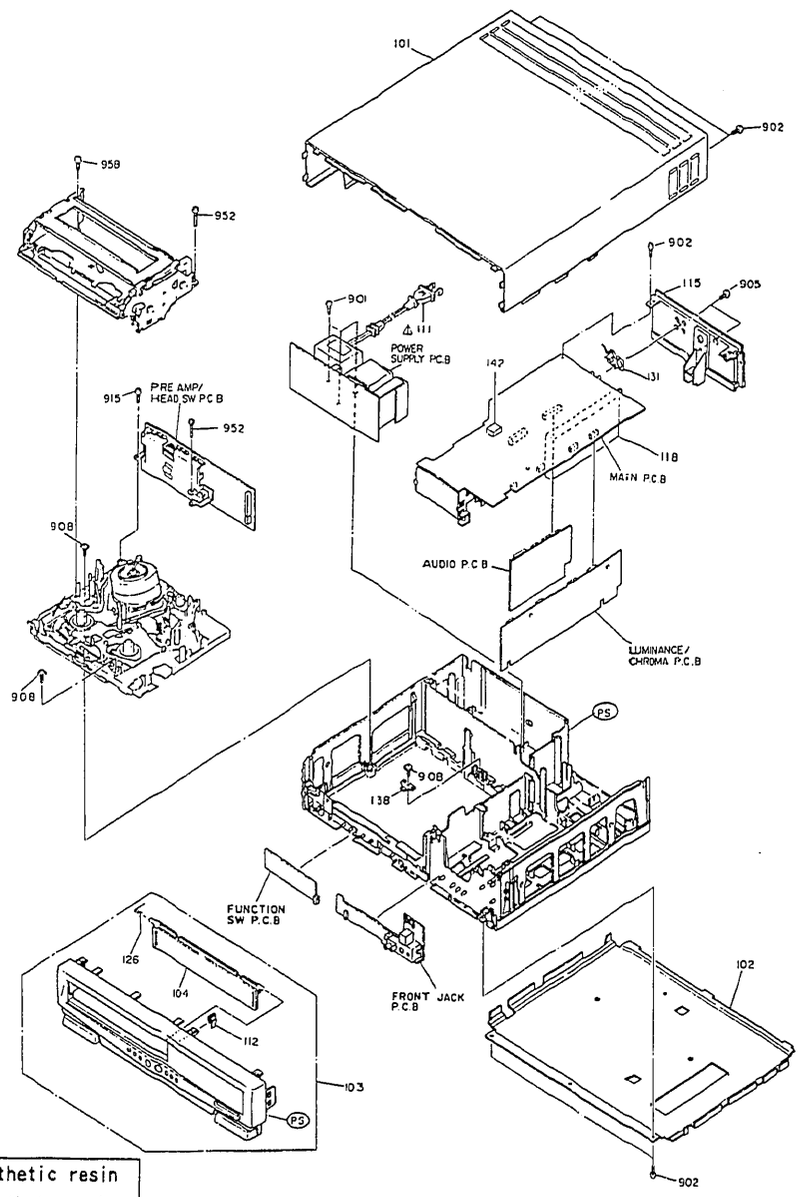
REG [POWER SUPPLY]
[PATTERN No. 152136-4]



MWB [SENSOR]
[PATTERN No. 152018-3]

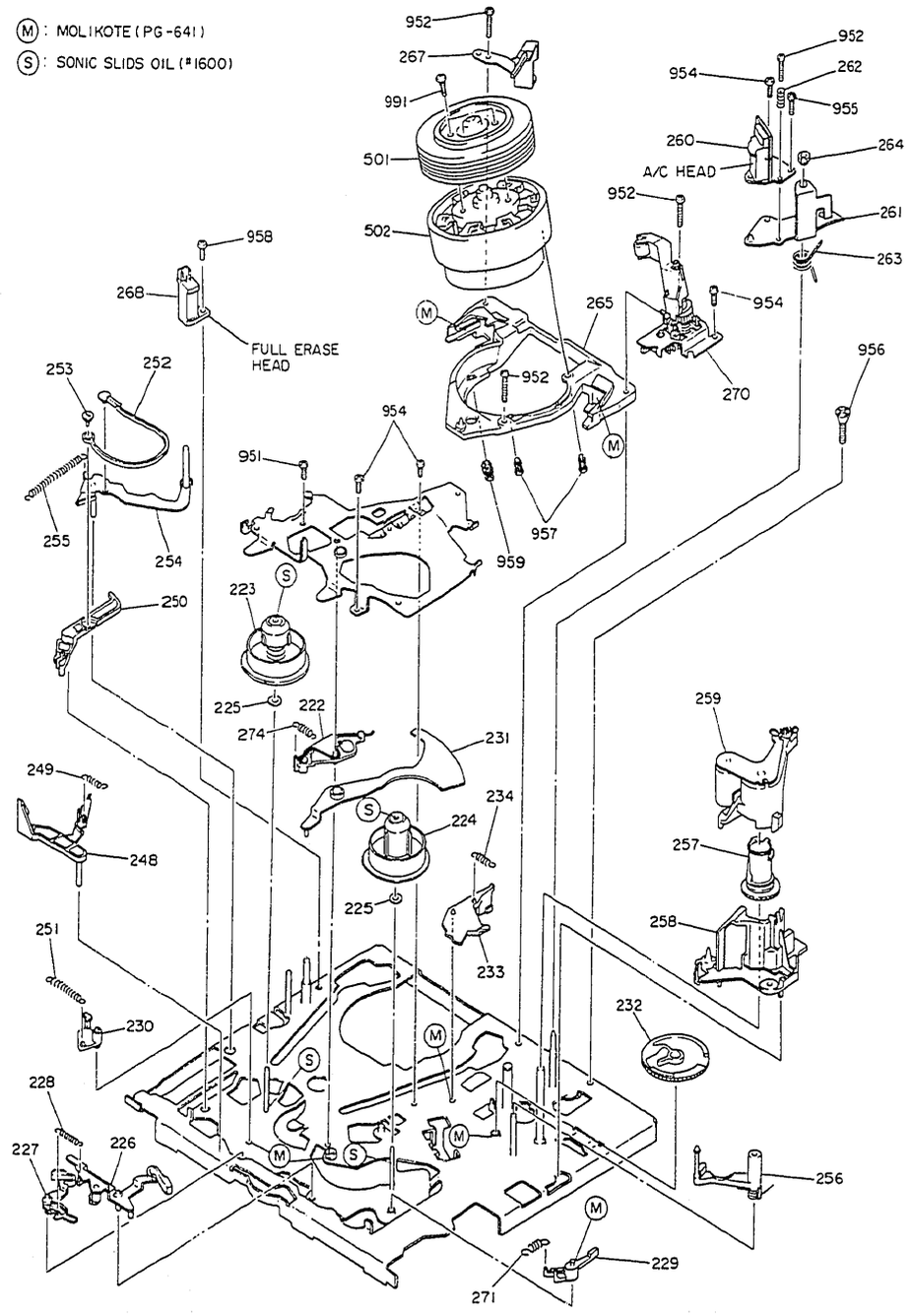
EXPLODED VIEWS

1. CABINET SECTION

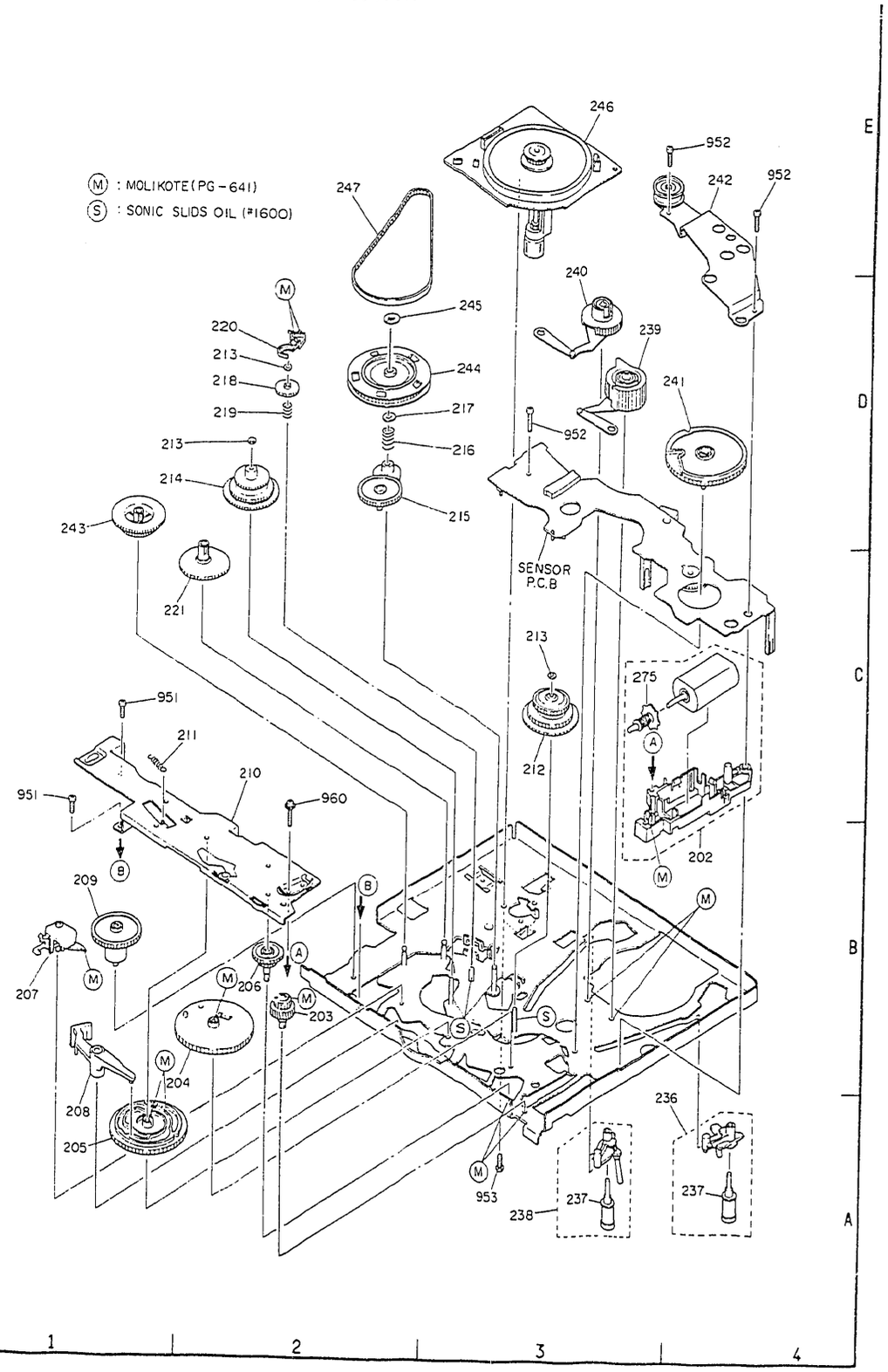


NOTE : The synthetic resin members that can be dismantled are shown by abbreviations using letters.

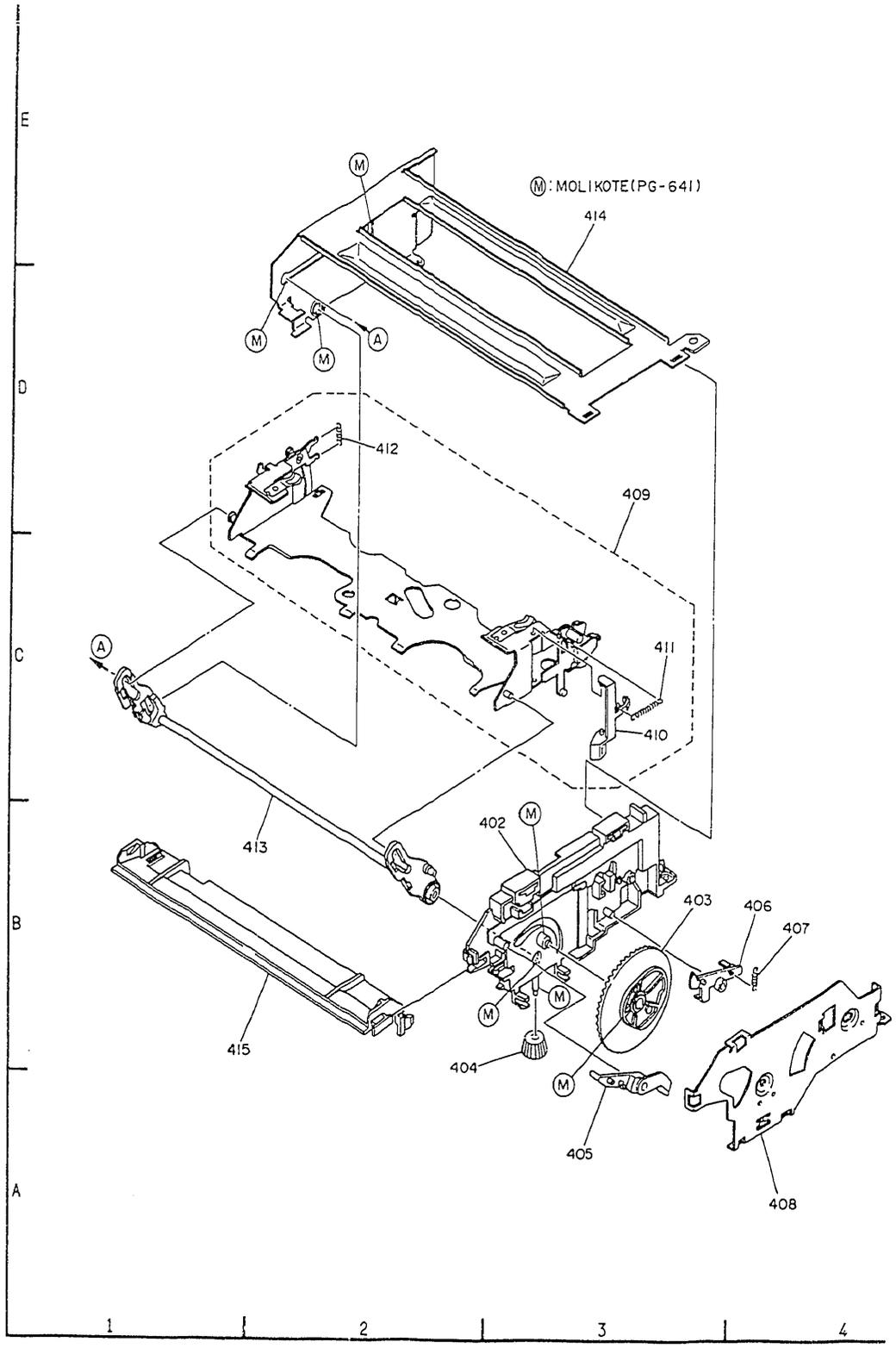
2. CHASSIS - I (TOP VIEW) SECTION



3. CHASSIS - II (BOTTOM VIEW) SECTION



4. CASSETTE LOADING MECHANISM SECTION



REPLACEMENT PARTS LIST
1. MECHANICAL PARTS LIST

SYMBOL-NO	P-NO	DESCRIPTION
		FOR FINAL ASSEMBLY
101	6009461	COVER, TOP
102	6009474	COVER, BOTTOM(HEPM)
103	UX10131	PANEL, FRONT(HEPM)(M181A)
103	UX10134	PANEL, FRONT(HEPM)(M281A)
104	PP10111	DOOR, CASSETTE(HEPM)
⚠111	5850753	CORD, POWER
112	4590321	STOPPER, DOOR
115	4725971	PANEL, REAR
118	5582211	TUNER IF UNIT(M181A)
118	5582221	TUNER IF UNIT(HEPM)(M281A)
126	6551851	SPRING, DOOR
131	7479971	PLATE
138	7429641	BRACKET
142	6562924	RUBBER
202	6500761	MOTOR, LOADING
203	6441371	GEAR
204	6441392	GEAR
205	6441403	GEAR
206	6441381	GEAR
207	6823133	ARM
208	6823171	ARM, OPERATION
209	6441421	GEAR
210	6500332	PLATE
211	6558551	SPRING
212	6405182	GEAR(HEPM)
213	7788341	WASHER
214	6405191	GEAR
215	6401445	ARM
216	6522979	SPRING
217	6500841	WASHER
218	6441433	GEAR, CHANGE
219	6522978	SPRING
220	6823183	ARM
221	6441411	GEAR
222	6823314	ARM
223	6416631	REEL, TABLE(S)
224	6416651	REEL, TABLE(T)
225	7789126	WASHER
226	6823195	ARM, BRAKE(R)
227	6823229	ARM, BRAKE(L)
228	6318613	SPRING
229	6823271	BRAKE
230	6823261	BRAKE
231	6500414	ARM
232	6823251	GEAR
233	6823292	BRAKE
234	6558452	SPRING
236	6638942	BASE, GUIDE ROLLER(I)
237	6358561	GUIDE ROLLER
238	6638954	BASE, GUIDE ROLLER(O)
239	6500504	GEAR, LOADING(L)
240	6500463	GEAR, LOADING(R)
241	6823537	GEAR, MODE
242	6358481	PLATE
243	6823542	GEAR
244	6823333	PULLEY
245	6500841	WASHER
246	1470084	DC MOTOR
247	6358101	BELT
248	6823423	ARM
249	6553361	SPRING
250	6823435	ARM
251	6553301	SPRING
252	6823473	BAND, TENSION
253	6823511	SHAFT
254	6500683	ARM, TENSION
255	6553352	SPRING
256	6638935	ARM
257	6823521	GEAR, CAM
258	6823445	BRACKET
259	6500432	ROLLER, PRESSURE
260	5434152	HEAD
261	6500592	BASE, HEAD
262	6304906	SPRING
263	6553151	SPRING
264	7785673	NUT
265	6638903	BASE, CYLINDER
267	5794062	BRUSH
268	5423081	HEAD, FULL ERASE
270	6500701	BRACKET
271	6558502	SPRING
274	6320576	SPRING
275	6816211	WORM
402	6823613	BRACKET
403	6823621	GEAR
404	6823631	GEAR
405	6823641	ARM(M181A)
405	6823642	ARM(M281A)
406	6823652	ARM(M181A)
406	6823653	ARM(M281A)
407	6558531	SPRING
408	6500612	BRACKET
409	6500622	HOLDER
410	6823291	ARM(M181A)
410	6823691	ARM(M281A)
411	6558541	SPRING
412	6558561	SPRING
413	6823662	ARM(M181A)
413	6823663	ARM(M281A)
414	6500672	BRACKET
415	6823701	HOLDER
501	5436751	CYLINDER, UPPER (CY-G4NK-U)(M281A)
501	5457962	UPPER CYLINDER (CY-Z2N)(M181A)
502	5435681	CYLINDER, LOWER (CY-Z2N)(M181A)
502	5435781	CYLINDER, LOWER (CY-G4NK-L)(M281A)
901	8699410	SCREW(3X10)
902	8699412	SCREW (3X12) BLACK
905	7781582	FALT SCREW-3MMDX10MM(BLACK)
908	7781138	SCREW(3X10BT)
915	0671305	DT SCREW-2.6MMDX5MM
951	0711304	SCREW(2.6X4)
952	0711312	PAN HEAD SCREW - 2.6MMD X 12MM
953	8691306	BT SCREW 2.6MM
954	0711306	PAN HEAD SCREW-2.6MMDX6MM
955	7773741	SCREW
956	4528181	SCREW
957	7775582	SCREW
958	0671308	DT SCREW-2.6MMDX8MM
959	8741408	SCREW (B3X8)
960	8650914	SCREW(2.6X14)
991	7784131	SCREW (3X8)
		FOR ACCESSARIES
	5857952	CONNECTOR
	5616491	REMOTE HAND SET(HEPM)

2. ELECTRICAL PARTS LIST

SYMBOL-NO	P-NO	DESCRIPTION
		CAPACITORS
C0201	0800032	ELECTROLYTIC 33UF 16V
C0202	0254371	ELECTROLYTIC 0.47UF 35V
C0203	0880057	POLYESTER FILM 0.1UF+-10% 50V
C0204	0800073	ELECTROLYTIC 470UF 10V
C0205	0254371	ELECTROLYTIC 0.47UF 35V
C0206	0880018	POLYESTER FILM 0.22UF+-10% 50V
C0207	0254371	ELECTROLYTIC 0.47UF 35V
C0208	0800001	ELECTROLYTIC 0.47UF 50V
C0209	0890021	CERAMIC DISC 82PF+-10% 50V
C0210	0800015	ELECTROLYTIC 10UF 16V
C0211	0800015	ELECTROLYTIC 10UF 16V
C0212	0800003	ELECTROLYTIC 1UF 50V
C0213	0800041	ELECTROLYTIC 47UF 16V
C0214	0800005	ELECTROLYTIC 2.2UF 50V
C0215	0800073	ELECTROLYTIC 470UF 10V
C0216	0800015	ELECTROLYTIC 10UF 16V
C0217	0890044	CERAMIC DISC 0.022UF+80-20% 25V
C0218	0800015	ELECTROLYTIC 10UF 16V
C0219	0800012	ELECTROLYTIC 4.7UF 50V
C0220	0800122	ELECTROLYTIC 10UF 16V
C0221	0800038	ELECTROLYTIC 47UF 6.3V
C0222	0890043	CERAMIC DISC 0.01UF+-20% 16V
C0223	0890016	CERAMIC DISC 39PF+-50% 50V
C0224	0890043	CERAMIC DISC 0.01UF+-20% 16V
C0225	0890119	CERAMIC DISC 27PF+-5% 50V
C0226	0890031	CERAMIC DISC 470PF+-10% 50V
C0227	0890041	CERAMIC DISC 6800PF+-20% 16V
C0228	0890043	CERAMIC DISC 0.01UF+-20% 16V
C0229	0890021	CERAMIC DISC 82PF+-10% 50V
C0230	0890046	CERAMIC DISC 0.1UF+80-20% 50V
C0231	0890016	CERAMIC DISC 39PF+-50% 50V
C0232	0880051	MYLAR 0.033UF+-10% 50V
C0233	0890123	CERAMIC DISC 47PF+-5% 50V
C0234	0890035	CERAMIC DISC 1000PF+-10% 50V
C0235	0890045	CERAMIC DISC 0.047UF+80-20% 50V
C0236	0890043	CERAMIC DISC 0.01UF+-20% 16V
C0237	0880048	MYLAR 0.022UF+-10% 50V
C0238	0890022	CERAMIC DISC 100PF+-10% 50V(M181A)
C0238	0890023	CERAMIC DISC 120PF+-10% 50V(M281A)
C0239	0890043	CERAMIC DISC 0.01UF+-20% 16V
C0240	0890008	CERAMIC DISC 10PF+-5% 50V(M281A)
C0240	0890014	CERAMIC DISC 27PF+-50% 50V(M181A)
C0241	0890043	CERAMIC DISC 0.01UF+-20% 16V
C0242	0890044	CERAMIC DISC 0.022UF+80-20% 25V
C0243	0890044	CERAMIC DISC 0.022UF+80-20% 25V
C0244	0890044	CERAMIC DISC 0.022UF+80-20% 25V
C0246	0890074	CERAMIC DISC 100PF+-5% 50V
C0248	0890017	CERAMIC DISC 47PF+-5% 50V
C0249	0890009	CERAMIC DISC 12PF+-5% 50V
C0250	0890044	CERAMIC DISC 0.022UF+80-20% 25V
C0251	0890043	CERAMIC DISC 0.01UF+-20% 16V
C0252	0890014	CERAMIC DISC 27PF+-50% 50V
C0254	0890018	CERAMIC DISC 56PF+-50% 50V
C0257	0208524	CERAMIC DISC 470PF+-5% 50V
C0258	0890043	CERAMIC DISC 0.01UF+-20% 16V
C0259	0890017	CERAMIC DISC 47PF+-5% 50V
C0260	0890015	CERAMIC DISC 33PF+-50% 50V
C0262	0890011	CERAMIC DISC 15PF+-5% 50V
C0263	0890043	CERAMIC DISC 0.01UF+-20% 16V
C0265	0890043	CERAMIC DISC 0.01UF+-20% 16V
C0268	0890043	CERAMIC DISC 0.01UF+-20% 16V
C0269	0890026	CERAMIC DISC 220PF+-10% 50V
C0270	0890035	CERAMIC DISC 1000PF+-10% 50V
C0271	0890044	CERAMIC DISC 0.022UF+80-20% 25V
C0274	0890044	CERAMIC DISC 0.022UF+80-20% 25V
C0275	0890043	CERAMIC DISC 0.01UF+-20% 16V
C0277	0890044	CERAMIC DISC 0.022UF+80-20% 25V
C0279	0890013	CERAMIC DISC 22PF+-5% 50V
C0280	0800105	ELECTROLYTIC 0.33UF 50V
C0284	0800105	ELECTROLYTIC 0.33UF 50V
C0285	0890029	CERAMIC DISC 390PF+-10% 50V
C0286	0890043	CERAMIC DISC 0.01UF+-20% 16V
C0287	0890043	CERAMIC DISC 0.01UF+-20% 16V
C0290	0890107	CERAMIC DISC 4PF+-0.25% 50V
C0292	0890043	CERAMIC DISC 0.01UF+-20% 16V
C0293	0890046	CERAMIC DISC 0.1UF+80-20% 50V
C0304	0890044	CERAMIC DISC 0.022UF+80-20% 25V
C0307	0890043	CERAMIC DISC 0.01UF+-20% 16V
C0308	0890043	CERAMIC DISC 0.01UF+-20% 16V
C0311	0890018	CERAMIC DISC 56PF+-50% 50V
C0315	0890106	CERAMIC DISC 3.0PF+-0.25% 50V
C0318	0890025	CERAMIC DISC 180PF+-10% 50V
C0401	0890102	CERAMIC DISC 0.022UF+80-20% 50V
C0402	0890089	CERAMIC DISC 1500PF+-10% 50V
C0403	0890094	CERAMIC DISC 3300PF+-10% 25V
C0404	0800107	ELECTROLYTIC 0.47UF 50V
C0405	0890085	CERAMIC DISC 680PF+-10% 50V
C0406	0800003	ELECTROLYTIC 1UF 50V
C0407	0800128	ELECTROLYTIC 22UF 16V
C0408	0890043	CERAMIC DISC 0.01UF+-20% 16V
C0409	0800003	ELECTROLYTIC 1UF 50V
C0410	0800122	ELECTROLYTIC 10UF 16V
C0411	0890037	CERAMIC DISC 2200PF+-20% 16V
C0412	0800117	ELECTROLYTIC 4.7UF 25V
C0413	0209644	CERAMIC DISC 33000PF+-10% 16V
C0415	0800001	ELECTROLYTIC 0.47UF 50V
C0416	0800003	ELECTROLYTIC 1UF 50V
C0417	0209641	CERAMIC DISC 10000PF+-10% 16V
C0419	0800128	ELECTROLYTIC 22UF 16V
C0420	0890043	CERAMIC DISC 0.01UF+-20% 16V
C0421	0890026	CERAMIC DISC 220PF+-10% 50V
C0422	0800032	ELECTROLYTIC 33UF 16V
C0423	0890038	CERAMIC DISC 3300PF+-20% 16V
C0424	0268449	MYLAR 0.047UF+-5% 50V
C0425	0800117	ELECTROLYTIC 4.7UF 25V
C0429	0800032	ELECTROLYTIC 33UF 16V
C0430	0800117	ELECTROLYTIC 4.7UF 25V
C0431	0800117	ELECTROLYTIC 4.7UF 25V
C0432	0800122	ELECTROLYTIC 10UF 16V
C0433	0800107	ELECTROLYTIC 0.47UF 50V
C0501	0800117	ELECTROLYTIC 4.7UF 25V
C0503	0800073	ELECTROLYTIC 470UF 10V
C0520	0800015	ELECTROLYTIC 10UF 16V
C0521	0800015	ELECTROLYTIC 10UF 16V
C0522	0890035	CERAMIC DISC 1000PF+-10% 50V
C0530	0800016	ELECTROLYTIC 10UF 25V
C0531	0800032	ELECTROLYTIC 33UF 16V
C0532	0800016	ELECTROLYTIC 10UF 25V
C0549	0800015	ELECTROLYTIC 10UF 16V
C0550	0800015	ELECTROLYTIC 10UF 16V
C0551	0208415	CERAMIC DISC 5.0PF+-0.25% 50V
C0552	0800015	ELECTROLYTIC 10UF 16V
C0554	0800015	ELECTROLYTIC 10UF 16V
C0601	0880011	POLYESTER FILM 0.015UF+-10% 50V
C0602	0207453	ELECTROLYTIC 2.2UF 50V
C0603	0207456	ELECTROLYTIC 1UF 50V
C0604	0207459	ELECTROLYTIC 0.47UF 50V
C0605	0880013	POLYESTER FILM 0.033UF+-10% 50V

SYMBOL-NO	P-NO	DESCRIPTION
C0607	0800122	ELECTROLYTIC 10UF 16V
C0609	0800122	ELECTROLYTIC 10UF 16V
C0610	0880033	MYLAR 1500PF+-10% 50V
C0611	0256140	ELECTROLYTIC 0.33UF 50V
C0612	0880048	MYLAR 0.022UF+-10% 50V
C0614	0880055	MYLAR 0.068UF+-10% 50V
C0615	0890045	CERAMIC DISC 0.047UF+80-20% 50V
C0616	0800005	ELECTROLYTIC 2.2UF 50V
C0617	0890087	CERAMIC 1000PF+-10% 50V
C0618	0800032	ELECTROLYTIC 33UF 16V
C0619	0800015	ELECTROLYTIC 10UF 16V
C0620	0890078	CERAMIC DISC 220PF+-10% 50V
C0621	0890014	CERAMIC DISC 27PF+-50% 50V
C0622	0800031	ELECTROLYTIC 33UF 10V
C0623	0890035	CERAMIC DISC 1000PF+-10% 50V
C0624	0890102	CERAMIC DISC 0.022UF+80-20% 50V
C0625	0880018	POLYESTER FILM 0.22UF+-10% 50V
C0626	0890038	CERAMIC DISC 3300PF+-20% 16V
C0627	0800015	ELECTROLYTIC 10UF 16V
C0629	0800015	ELECTROLYTIC 10UF 16V
C0630	0890034	CERAMIC DISC 820PF+-10% 5V
C0631	0890023	CERAMIC DISC 120PF+-10% 50V
C0632	0800022	ELECTROLYTIC 22UF 10V
C0633	0890044	CERAMIC DISC 0.022UF+80-20% 25V
C0634	0890028	CERAMIC DISC 330PF+-10% 50V
C0637	0800041	ELECTROLYTIC 47UF 16V
C0638	0890046	CERAMIC DISC 0.1UF+80-20% 50V
C0639	0890025	CERAMIC DISC 180PF+-10% 50V
C0700	0890043	CERAMIC DISC 0.01UF+-20% 16V
C0701	0890043	CERAMIC DISC 0.01UF+-20% 16V
C0702	0890043	CERAMIC DISC 0.01UF+-20% 16V
C0703	0890043	CERAMIC DISC 0.01UF+-20% 16V
C0704	0800033	ELECTROLYTIC 33UF 25V
C0705	0890102	CERAMIC DISC 0.022UF+80-20% 50V
C0706	0890102	CERAMIC DISC 0.022UF+80-20% 50V
C0707	0800049	ELECTROLYTIC 100UF 16V
C0708	0890045	CERAMIC DISC 0.047UF+80-20% 50V
C0709	0890092	CERAMIC DISC 2200PF+-10% 50V
C0710	0890043	CERAMIC DISC 0.01UF+-20% 16V
C0711	0800032	ELECTROLYTIC 33UF 16V
C0712	0800015	ELECTROLYTIC 10UF 16V
C0713	0800358	ELECTROLYTIC 1000UF 6.3V
C0718	0890102	CERAMIC DISC 0.022UF+80-20% 50V
C0721	0800044	ELECTROLYTIC 47UF 50V
C0722	0890045	CERAMIC DISC 0.047UF+80-20% 50V
C0723	0890045	CERAMIC DISC 0.047UF+80-20% 50V
C0724	0890103	CERAMIC DISC 47000PF+80-20% 12V
C0725	0890015	CERAMIC DISC 33PF+-50% 50V
C0728	0890046	CERAMIC DISC 0.1UF+80-20% 50V
C0730	0890087	CERAMIC 1000PF+-10% 50V
C0801	0800049	ELECTROLYTIC 100UF 16V
C0802	0800117	ELECTROLYTIC 4.7UF 25V(M281A)
C0851	0890102	CERAMIC DISC 0.022UF+80-20% 50V
C0852	0880053	POLYESTER FILM 0.047UF+-10% 50V
C0853	0800044	ELECTROLYTIC 47UF 50V
C0854	0800044	ELECTROLYTIC 47UF 50V
C0855	0800044	ELECTROLYTIC 47UF 50V
C0856	0890102	CERAMIC DISC 0.022UF+80-20% 50V
C0857	0254045	ELECTROLYTIC 2200UF+-20% 16V
C0858	0800015	ELECTROLYTIC 10UF 16V
C0860	0890102	CERAMIC DISC 0.022UF+80-20% 50V
C0861	0254046	ELECTROLYTIC 4700UF+-20% 25V
C0862	0800041	ELECTROLYTIC 47UF 16V
C0863	0890022	CERAMIC DISC 100PF+-10% 50V
C0864	0800015	ELECTROLYTIC 10UF 16V
C0865	0800001	ELECTROLYTIC 0.47UF 50V
C0866	0800001	ELECTROLYTIC 0.47UF 50V
C0867	0800041	ELECTROLYTIC 47UF 16V
C0868	0800015	ELECTROLYTIC 10UF 16V
C1201	0890044	CERAMIC DISC 0.022UF+80-20% 25V
C1202	0890044	CERAMIC DISC 0.022UF+80-20% 25V
C1203	0890044	CERAMIC DISC 0.022UF+80-20% 25V
C1204	0890043	CERAMIC DISC 0.01UF+-20% 16V
C1205	0890045	CERAMIC DISC 0.047UF+80-20% 50V
C1206	0800122	ELECTROLYTIC 10UF 16V
C1207	0890076	CERAMIC DISC 150PF+-10% 50V
C1208	0890044	CERAMIC DISC 0.022UF+80-20% 25V(M281A)
C1215	0890046	CERAMIC DISC 0.1UF+80-20% 50V
C1299	0890103	CERAMIC DISC 47000PF+80-20% 12V
C1401	0800041	ELECTROLYTIC 47UF 16V
C1404	0800003	ELECTROLYTIC 1UF 50V
C1405	0208458	CERAMIC DISC 56PF+-5% 50V
C1406	0208458	CERAMIC DISC 56PF+-5% 50V
C1407	0890112	CERAMIC CHIP 8PF+-0.5% 50V
C1408	0890114	CERAMIC DISC 10PF+-0.5PF 50V
C1410	0890045	CERAMIC DISC 0.047UF+80-20% 50V
C1411	0800015	ELECTROLYTIC 10UF 16V
C1412	0890044	CERAMIC DISC 0.022UF+80-20% 25V
C1441	0800048	ELECTROLYTIC 100UF 10V
C1442	0890013	CERAMIC DISC 22PF+-5% 50V
C1443	0204333	POLYESTER FILM 470PF+-5% 100V
C1444	0800101	ELECTROLYTIC 0.1UF 50V
C1451	0890083	CERAMIC DISC 470PF+-10% 50V
C1452	0800117	ELECTROLYTIC 4.7UF 25V
C1461	0880031	MYLAR 1000PF+-10% 50V
C1462	0890094	CERAMIC DISC 3300PF+-10% 25V
C1464	0890044	CERAMIC DISC 0.022UF+80-20% 25V
C1466	0890031	CERAMIC DISC 470PF+-10% 50V
C1801	0800061	ELECTROLYTIC 220UF 35V
C1802	0800018	ELECTROLYTIC 10UF 50V
C1803	0800041	ELECTROLYTIC 47UF 16V
C1806	0890044	CERAMIC DISC 0.022UF+80-20% 25V
C1808	0890034	CERAMIC DISC 820PF+-10% 5V
C1810	0890044	CERAMIC DISC 0.022UF+80-20% 25V
C2101	0890045	CERAMIC DISC 0.047UF+80-20% 50V

		RESISTORS
R0201	0700058	CARBON FILM 22KOHM+-5% 1/8W
R0202	0700045	CARBON FILM 2.2KOHM+-5% 1/8W
R0203	0700061	CARBON FILM 33KOHM+-5% 1/8W
R0204	0700058	CARBON FILM 22KOHM+-5% 1/8W
R0205	0700061	CARBON FILM 33KOHM+-5% 1/8W
R0206	0700045	CARBON FILM 2.2KOHM+-5% 1/8W
R0207	0700041	CARBON FILM 1.0KOHM+-5% 1/8W
R0209	0700041	CARBON FILM 1.0KOHM+-5% 1/8W
R0210	0700043	CARBON FILM 1.5KOHM+-5% 1/8W
R0211	0700056	CARBON FILM 15KOHM+-5% 1/8W
R0212	0700042	CARBON FILM 1.2KOHM+-5% 1/8W
R0213	0700041	CARBON FILM 1.0KOHM+-5% 1/8W
R0214	0700051	CARBON FILM 5.6KOHM+-5% 1/8W
R0215	0700042	CARBON FILM 1.2KOHM+-5% 1/8W
R0216	0101767	RESISTOR 18KOHM+-1% 1/8W
R0217	0700029	CARBON FILM 150 OHM+-5% 1/8W(M281A)
R0217	0700039	CARBON FILM 8200HM+-5% 1/8W(M181A)
R0218	0700057	CARBON FILM 18KOHM+-5% 1/8W
R0219	0700034	CARBON FILM 3300HM+-5% 1/8W
R0222	0700058	CARBON FILM 22KOHM+-5% 1/8W
R0223	0101758	RESISTOR 1.8KOHM+-1%1/8W
R0224	0700052	CARBON FILM 6.8KOHM+-5% 1/8W

SYMBOL-NO	P-NO	DESCRIPTION
R0226	0700041	CARBON FILM 1.0KOHM+-5% 1/8W
R0227	0700049	CARBON FILM 4.7KOHM+-5% 1/8W
R0228	0700041	CARBON FILM 1.0KOHM+-5% 1/8W
R0229	0700054	CARBON FILM 10KOHM+-5% 1/8W
R0240	0700041	CARBON FILM 1.0KOHM+-5% 1/8W
R0244	0700045	CARBON FILM 2.2KOHM+-5% 1/8W
R0245	0700037	CARBON FILM 560OHM+-5% 1/8W
R0246	0700037	CARBON FILM 560 OHM+-5% 1/8W
R0247	0700041	CARBON FILM 1.0KOHM+-5% 1/8W
R0248	0700036	CARBON FILM 470 OHM+-5% 1/8W
R0249	0700038	CARBON FILM 680OHM+-5% 1/8W
R0250	0700052	CARBON FILM 6.8KOHM+-5% 1/8W
R0251	0700037	CARBON FILM 560OHM+-5% 1/8W
R0252	0700045	CARBON FILM 2.2KOHM+-5% 1/8W
R0253	0700081	CARBON FILM 1.0MOHM+-5% 1/8W
R0255	0700038	CARBON FILM 680OHM+-5% 1/8W
R0256	0700041	CARBON FILM 1.0KOHM+-5% 1/8W
R0257	0700061	CARBON FILM 33KOHM+-5% 1/8W
R0260	0700057	CARBON FILM 18KOHM+-5% 1/8W
R0263	0700046	CARBON FILM 2.7KOHM+-5% 1/8W
R0264	0700053	CARBON FILM 8.2KOHM+-5% 1/8W
R0266	0700076	CARBON FILM 470KOHM+-5% 1/8W
R0267	0700047	CARBON FILM 3.3KOHM+-5% 1/8W
R0270	0700041	CARBON FILM 1.0KOHM+-5% 1/8W
R0271	0700058	CARBON FILM 22KOHM+-5% 1/8W
R0272	0700041	CARBON FILM 1.0KOHM+-5% 1/8W
R0273	0700036	CARBON FILM 470 OHM+-5% 1/8W
R0274	0700041	CARBON FILM 1.0KOHM+-5% 1/8W
R0275	0700061	CARBON FILM 33KOHM+-5% 1/8W
R0277	0700045	CARBON FILM 2.2KOHM+-5% 1/8W
R0282	0700041	CARBON FILM 1.0KOHM+-5% 1/8W
R0283	0700041	CARBON FILM 1.0KOHM+-5% 1/8W
R0284	0700049	CARBON FILM 4.7KOHM+-5% 1/8W
R0285	0700047	CARBON FILM 3.3KOHM+-5% 1/8W
R0287	0700081	CARBON FILM 1.0MOHM+-5% 1/8W
R0288	0700076	CARBON FILM 470KOHM+-5% 1/8W
R0289	0700032	CARBON FILM 220 OHM+-5% 1/8W
R0290	0700052	CARBON FILM 6.8KOHM+-5% 1/8W(M281A)
R0290	0700054	CARBON FILM 10KOHM+-5% 1/8W(M181A)
R0293	0700048	CARBON FILM 3.9KOHM+-5% 1/8W
R0295	0700057	CARBON FILM 18KOHM+-5% 1/8W
R0296	0700043	CARBON FILM 1.5KOHM+-5% 1/8W
R0297	0700048	CARBON FILM 3.9KOHM+-5% 1/8W
R0298	0101764	RESISTOR 5.6KOHM+-1%1/8W
R0301	0700049	CARBON FILM 4.7KOHM+-5% 1/8W
R0302	0700047	CARBON FILM 3.3KOHM+-5% 1/8W
R0303	0700045	CARBON FILM 2.2KOHM+-5% 1/8W
R0304	0700041	CARBON FILM 1.0KOHM+-5% 1/8W
R0306	0700043	CARBON FILM 1.5KOHM+-5% 1/8W
R0308	0700032	CARBON FILM 220 OHM+-5% 1/8W(M181A)
R0308	0700041	CARBON FILM 1.0KOHM+-5% 1/8W(M281A)
R0315	0700036	CARBON FILM 470 OHM+-5% 1/8W
R0401	0700063	CARBON FILM 47KOHM+-5% 1/8W
R0402	0700032	CARBON FILM 220 OHM+-5% 1/8W
R0403	0700031	CARBON FILM 180OHM+-5% 1/8W
R0404	0700073	CARBON FILM 270KOHM+-5% 1/8W
R0405	0700053	CARBON FILM 8.2KOHM+-5% 1/8W
R0406	0700081	CARBON FILM 1.0MOHM+-5% 1/8W
R0408	0700061	CARBON FILM 33KOHM+-5% 1/8W
R0409	0700056	CARBON FILM 15KOHM+-5% 1/8W
R0410	0700042	CARBON FILM 1.2KOHM+-5% 1/8W
R0411	0700061	CARBON FILM 33KOHM+-5% 1/8W
R0412	0700063	CARBON FILM 47KOHM+-5% 1/8W
R0413	0700049	CARBON FILM 4.7KOHM+-5% 1/8W
R0414	0700049	CARBON FILM 4.7KOHM+-5% 1/8W
R0415	0700049	CARBON FILM 4.7KOHM+-5% 1/8W
R0416	0700061	CARBON FILM 33KOHM+-5% 1/8W
R0418	0700058	CARBON FILM 22KOHM+-5% 1/8W
R0419	0700042	CARBON FILM 1.2KOHM+-5% 1/8W
R0420	0700049	CARBON FILM 4.7KOHM+-5% 1/8W
R0421	0700036	CARBON FILM 470 OHM+-5% 1/8W
R0423	0700052	CARBON FILM 6.8KOHM+-5% 1/8W
R0424	0700031	CARBON FILM 180OHM+-5% 1/8W
R0425	0700059	CARBON FILM 27KOHM+-5% 1/8W
R0426	0700055	CARBON FILM 12KOHM+-5% 1/8W
R0428	0700058	CARBON FILM 22KOHM+-5% 1/8W
R0429	0101801	CARBON FILM 2.2 OHM+-5% 1/4W
R0430	0700014	CARBON FILM 100HM+-5% 1/8W
R0431	0700054	CARBON FILM 10KOHM+-5% 1/8W
R0432	0700054	CARBON FILM 10KOHM+-5% 1/8W
R0433	0700054	CARBON FILM 10KOHM+-5% 1/8W
R0453	0700051	CARBON FILM 5.6KOHM+-5% 1/8W
R0454	0700049	CARBON FILM 4.7KOHM+-5% 1/8W
R0457	0700038	CARBON FILM 680OHM+-5% 1/8W
R0458	0700063	CARBON FILM 47KOHM+-5% 1/8W
R0521	0700032	CARBON FILM 220 OHM+-5% 1/8W
R0522	0700031	CARBON FILM 180OHM+-5% 1/8W
R0523	0700027	CARBON FILM 100 OHM+-5% 1/8W
R0524	0700025	CARBON FILM 68OHM+-5% 1/8W
R0531	0700027	CARBON FILM 100 OHM+-5% 1/8W
R0534	0101400	CARBON FILM 750HM+-5% 1/8W
R0570	0700032	CARBON FILM 220 OHM+-5% 1/8W
R0571	0700045	CARBON FILM 2.2KOHM+-5% 1/8W
R0575	0700063	CARBON FILM 47KOHM+-5% 1/8W
R0576	0700058	CARBON FILM 22KOHM+-5% 1/8W
R0577	0700067	CARBON FILM 100KOHM+-5% 1/8W
R0578	0700067	CARBON FILM 100KOHM+-5% 1/8W
R0579	0700067	CARBON FILM 100KOHM+-5% 1/8W
R0580	0700063	CARBON FILM 47KOHM+-5% 1/8W
R0581	0700058	CARBON FILM 22KOHM+-5% 1/8W
R0582	0700067	CARBON FILM 100KOHM+-5% 1/8W
R0583	0700063	CARBON FILM 47KOHM+-5% 1/8W
R0601	0700062	CARBON FILM 39KOHM+-5% 1/8W
R0602	0700081	CARBON FILM 1.0MOHM+-5% 1/8W
R0603	0700058	CARBON FILM 22KOHM+-5% 1/8W
R0604	0700073	CARBON FILM 270KOHM+-5% 1/8W
R0605	0700045	CARBON FILM 2.2KOHM+-5% 1/8W
R0606	0700061	CARBON FILM 33KOHM+-5% 1/8W
R0608	0700081	CARBON FILM 1.0MOHM+-5% 1/8W
R0609	0700081	CARBON FILM 1.0MOHM+-5% 1/8W
R0610	0700041	CARBON FILM 1.0KOHM+-5% 1/8W
R0611	0700081	CARBON FILM 1.0MOHM+-5% 1/8W
R0612	0700062	CARBON FILM 39KOHM+-5% 1/8W
R0613	0700068	CARBON FILM 120KOHM+-5% 1/8W
R0614	0700065	CARBON FILM 68KOHM+-5% 1/8W
R0615	0700057	CARBON FILM 18KOHM+-5% 1/8W
R0616	0700051	CARBON FILM 5.6KOHM+-5% 1/8W
R0617	0700067	CARBON FILM 100KOHM+-5% 1/8W
R0618	0700081	CARBON FILM 1.0MOHM+-5% 1/8W
R0619	0700065	CARBON FILM 68KOHM+-5% 1/8W
R0620	0700049	CARBON FILM 4.7KOHM+-5% 1/8W
R0621	0700041	CARBON FILM 1.0KOHM+-5% 1/8W
R0622	0700046	CARBON FILM 2.7KOHM+-5% 1/8W
R0623	0700042	CARBON FILM 1.2KOHM+-5% 1/8W
R0624	0700062	CARBON FILM 39KOHM+-5% 1/8W
R0625	0700055	CARBON FILM 12KOHM+-5% 1/8W
R0626	0700038	CARBON FILM 680OHM+-5% 1/8W
R0627	0700038	CARBON FILM 680OHM+-5% 1/8W
R0628	0700041	CARBON FILM 1.0KOHM+-5% 1/8W
R0629	0700063	CARBON FILM 47KOHM+-5% 1/8W

SYMBOL-NO	P-NO	DESCRIPTION
R0630	0700081	CARBON FILM 1.0MOHM+-5% 1/8W
R0631	0700072	CARBON FILM 220KOHM+-5% 1/8W
R0632	0700049	CARBON FILM 4.7KOHM+-5% 1/8W
R0633	0700054	CARBON FILM 10KOHM+-5% 1/8W
R0634	0700063	CARBON FILM 47KOHM+-5% 1/8W
R0635	0700038	CARBON FILM 680OHM+-5% 1/8W
R0636	0700063	CARBON FILM 47KOHM+-5% 1/8W
R0637	0700063	CARBON FILM 47KOHM+-5% 1/8W
R0638	0700063	CARBON FILM 47KOHM+-5% 1/8W
R0639	0700063	CARBON FILM 47KOHM+-5% 1/8W
R0640	0700041	CARBON FILM 1.0KOHM+-5% 1/8W
R0641	0700063	CARBON FILM 47KOHM+-5% 1/8W
R0642	0700079	CARBON FILM 820KOHM+-5% 1/8W
R0643	0700041	CARBON FILM 1.0KOHM+-5% 1/8W
R0644	0700041	CARBON FILM 1.0KOHM+-5% 1/8W
R0645	0700041	CARBON FILM 1.0KOHM+-5% 1/8W
R0700	0700067	CARBON FILM 100KOHM+-5% 1/8W
R0701	0700033	CARBON FILM 270OHM+-5% 1/8W
R0702	0700031	CARBON FILM 180OHM+-5% 1/8W
R0703	0700067	CARBON FILM 100KOHM+-5% 1/8W
R0704	0700067	CARBON FILM 100KOHM+-5% 1/8W
R0705	0700067	CARBON FILM 100KOHM+-5% 1/8W
R0706	01704713	FUSE RESISTOR 2.2OHM+-5% 1/4W
R0707	0700066	CARBON FILM 82KOHM+-5% 1/8W
R0708	0700066	CARBON FILM 82KOHM+-5% 1/8W
R0709	0700054	CARBON FILM 10KOHM+-5% 1/8W
R0710	0700054	CARBON FILM 10KOHM+-5% 1/8W
R0711	0700061	CARBON FILM 33KOHM+-5% 1/8W
R0712	0700061	CARBON FILM 33KOHM+-5% 1/8W
R0713	0700027	CARBON FILM 100 OHM+-5% 1/8W
R0714	0700027	CARBON FILM 100 OHM+-5% 1/8W
R0715	0700054	CARBON FILM 10KOHM+-5% 1/8W
R0716	0700054	CARBON FILM 10KOHM+-5% 1/8W
R0717	0700054	CARBON FILM 10KOHM+-5% 1/8W
R0718	0700054	CARBON FILM 10KOHM+-5% 1/8W
R0719	0700054	CARBON FILM 10KOHM+-5% 1/8W
R0720	0700054	CARBON FILM 10KOHM+-5% 1/8W
R0721	0700054	CARBON FILM 10KOHM+-5% 1/8W
R0722	0700054	CARBON FILM 10KOHM+-5% 1/8W
R0723	0700054	CARBON FILM 10KOHM+-5% 1/8W
R0724	0700063	CARBON FILM 47KOHM+-5% 1/8W
R0726	0700063	CARBON FILM 47KOHM+-5% 1/8W
R0727	0101765	RESISTOR 10KOHM+-1% 1/8W
R0728	0700049	CARBON FILM 4.7KOHM+-5% 1/8W
R0729	0700049	CARBON FILM 4.7KOHM+-5% 1/8W
R0730	0700063	CARBON FILM 47KOHM+-5% 1/8W
R0731	0700047	CARBON FILM 3.3KOHM+-5% 1/8W
R0732	0700047	CARBON FILM 3.3KOHM+-5% 1/8W
R0734	0700045	CARBON FILM 2.2KOHM+-5% 1/8W
R0735	0700045	CARBON FILM 2.2KOHM+-5% 1/8W
R0736	0700058	CARBON FILM 22KOHM+-5% 1/8W
R0739	0700041	CARBON FILM 1.0KOHM+-5% 1/8W
R0740	0700041	CARBON FILM 1.0KOHM+-5% 1/8W
R0741	0700054	CARBON FILM 10KOHM+-5% 1/8W
R0743	0700058	CARBON FILM 22KOHM+-5% 1/8W
R0744	0700041	CARBON FILM 1.0KOHM+-5% 1/8W
R0745	0700051	CARBON FILM 5.6KOHM+-5% 1/8W
R0746	0700041	CARBON FILM 1.0KOHM+-5% 1/8W
R0747	0700032	CARBON FILM 220 OHM+-5% 1/8W
R0748	0700038	CARBON FILM 680OHM+-5% 1/8W
R0749	0700054	CARBON FILM 10KOHM+-5% 1/8W
R0751	0700062	CARBON FILM 39KOHM+-5% 1/8W(M281A)
R0752	0700049	CARBON FILM 4.7KOHM+-5% 1/8W
R0753	0700061	CARBON FILM 33KOHM+-5% 1/8W
R0761	0700063	CARBON FILM 47KOHM+-5% 1/8W
R0762	0700045	CARBON FILM 2.2KOHM+-5% 1/8W
R0763	0700041	CARBON FILM 1.0KOHM+-5% 1/8W
R0764	0700047	CARBON FILM 3.3KOHM+-5% 1/8W
R0765	0700047	CARBON FILM 3.3KOHM+-5% 1/8W
R0766	0700049	CARBON FILM 4.7KOHM+-5% 1/8W
R0767	0700045	CARBON FILM 2.2KOHM+-5% 1/8W
R0768	0700048	CARBON FILM 3.9KOHM+-5% 1/8W
R0769	0700045	CARBON FILM 2.2KOHM+-5% 1/8W
R0770	0700041	CARBON FILM 1.0KOHM+-5% 1/8W
R0772	0700068	CARBON FILM 120KOHM+-5% 1/8W
R0774	0700009	CARBON FILM 4.7OHM+-5% 1/8W
R0775	0700041	CARBON FILM 1.0KOHM+-5% 1/8W
R0801	0700041	CARBON FILM 1.0KOHM+-5% 1/8W
R0802	0700046	CARBON FILM 2.7KOHM+-5% 1/8W
R0803	0101847	CARBON FILM 15KOHM+-5% 1/4W
R0804	0101847	CARBON FILM 15KOHM+-5% 1/4W
R0805	0700047	CARBON FILM 3.3KOHM+-5% 1/8W
R0806	0700041	CARBON FILM 1.0KOHM+-5% 1/8W
R0807	0700054	CARBON FILM 10KOHM+-5% 1/8W
R0808	0700041	CARBON FILM 1.0KOHM+-5% 1/8W
R0851	0134706	COMPOSITION 3.3MOHM+-10% 1/2W
R0853	0700071	CARBON FILM 180KOHM+-5% 1/8W
R0854	0101838	CARBON FILM 2.7KOHM+-5% 1/4W
R0855	0101838	CARBON FILM 2.7KOHM+-5% 1/4W
R0858	0700046	CARBON FILM 2.7KOHM+-5% 1/8W
R0859	0700058	CARBON FILM 22KOHM+-5% 1/8W
R0860	0101846	CARBON FILM 12KOHM+-5% 1/4W
R0861	0101846	CARBON FILM 12KOHM+-5% 1/4W
R0862	0700045	CARBON FILM 2.2KOHM+-5% 1/8W
R0863	0700063	CARBON FILM 47KOHM+-5% 1/8W
R0864	0700058	CARBON FILM 22KOHM+-5% 1/8W
R0865	0700058	CARBON FILM 22KOHM+-5% 1/8W
R0866	0700058	CARBON FILM 22KOHM+-5% 1/8W
R1201	0700038	CARBON FILM 680OHM+-5% 1/8W
R1202	0700045	CARBON FILM 2.2KOHM+-5% 1/8W
R1203	0700045	CARBON FILM 2.2KOHM+-5% 1/8W
R1204	0700038	CARBON FILM 680OHM+-5% 1/8W
R1206	0700052	CARBON FILM 6.8KOHM+-5% 1/8W
R1207	0700054	CARBON FILM 10KOHM+-5% 1/8W
R1208	0700039	CARBON FILM 820OHM+-5% 1/8W
R1209	0700057	CARBON FILM 18KOHM+-5% 1/8W(M281A)
R1401	0700053	CARBON FILM 8.2KOHM+-5% 1/8W
R1402	0700055	CARBON FILM 12KOHM+-5% 1/8W
R1411	0700045	CARBON FILM 2.2KOHM+-5% 1/8W
R1412	0700046	CARBON FILM 2.7KOHM+-5% 1/8W
R1413	0700069	CARBON FILM 150KOHM+-5% 1/8W
R1414	0700027	CARBON FILM 100 OHM+-5% 1/8W
R1415	0700041	CARBON FILM 1.0KOHM+-5% 1/8W
R1441	0101765	RESISTOR 10KOHM+-1% 1/8W
R1442	0101736	METAL FILM 120KOHM+-1% 1/8W
R1443	0700077	CARBON FILM 560KOHM+-5% 1/8W
R1444	0700058	CARBON FILM 22KOHM+-5% 1/8W
R1452	0700041	CARBON FILM 1.0KOHM+-5% 1/8W
R1453	0700042	CARBON FILM 1.2KOHM+-5% 1/8W
R1455	0700077	CARBON FILM 560KOHM+-5% 1/8W
R1461	0700053	CARBON FILM 8.2KOHM+-5% 1/8W
R1462	0700027	CARBON FILM 100 OHM+-5% 1/8W
R1463	0700058	CARBON FILM 22KOHM+-5% 1/8W
R1464	0700041	CARBON FILM 1.0KOHM+-5% 1/8W
R1465	0700041	CARBON FILM 1.0KOHM+-5% 1/8W
R1466	0700051	CARBON FILM 5.6KOHM+-5% 1/8W
R1467	0700057	CARBON FILM 18KOHM+-5% 1/8W
R1468	0700056	CARBON FILM 15KOHM+-5% 1/8W
R1469	0700054	CARBON FILM 10KOHM+-5% 1/8W
R1470	0700041	CARBON FILM 1.0KOHM+-5% 1/8W

SYMBOL-NO	P-NO	DESCRIPTION
R1471	0700038	CARBON FILM 680OHM+-5% 1/8W
R1472	0700062	CARBON FILM 39KOHM+-5% 1/8W
R1473	0700062	CARBON FILM 39KOHM+-5% 1/8W
R1474	0700058	CARBON FILM 22KOHM+-5% 1/8W
R1475	0700041	CARBON FILM 1.0KOHM+-5% 1/8W
R1476	0700054	CARBON FILM 10KOHM+-5% 1/8W
R1477	0700041	CARBON FILM 1.0KOHM+-5% 1/8W
R1701	0700041	CARBON FILM 1.0KOHM+-5% 1/8W
R1702	0700039	CARBON FILM 820OHM+-5% 1/8W
R1703	0700041	CARBON FILM 1.0KOHM+-5% 1/8W
R1704	0700041	CARBON FILM 1.0KOHM+-5% 1/8W
R1705	0700027	CARBON FILM 100 OHM+-5% 1/8W
R1706	0700042	CARBON FILM 1.2KOHM+-5% 1/8W
R1707	0700032	CARBON FILM 220 OHM+-5% 1/8W
R1713	0700047	CARBON FILM 3.3KOHM+-5% 1/8W
R1801	0700079	CARBON FILM 820KOHM+-5% 1/8W
R1802	0700078	CARBON FILM 680KOHM+-5% 1/8W
R1804	0101839	CARBON FILM 3.3KOHM+-5% 1/4W
R1805	0101839	CARBON FILM 3.3KOHM+-5% 1/4W
R1806	0700052	CARBON FILM 6.8KOHM+-5% 1/8W
R1807	0700067	CARBON FILM 100KOHM+-5% 1/8W
R1810	0700056	CARBON FILM 15KOHM+-5% 1/8W
R1811	0700061	CARBON FILM 33KOHM+-5% 1/8W(M281A)
R3500	0101400	CARBON FILM 75OHM+-5% 1/8W
R3501	0700043	CARBON FILM 1.5KOHM+-5% 1/8W
R3502	0700029	CARBON FILM 150 OHM+-5% 1/8W
R3503	0700044	CARBON FILM 1.8KOHM+-5% 1/8W
R3504	0700045	CARBON FILM 2.2KOHM+-5% 1/8W
R3505	0700035	CARBON FILM 390OHM+-5% 1/8W
△RF852	0101712	FUSE RESISTOR 6.80HM+-5% 1/4W
RT0201	5030086	SEMI VARIABLE 4.7KOHM
RT0202	5007447	SEMI VARIABLE 10KOHM
RT0203	5007435	SEMI VARIABLE 10KOHM
RT0204	5007447	SEMI VARIABLE 10KOHM
RT0206	5007435	SEMI VARIABLE 10KOHM
RT0208	5007435	SEMI VARIABLE 10KOHM
RT0401	5006242	SEMI VARIABLE 220KOHM
RT0601	5030012	SEMI VARIABLE 220KOHM
RT1801	5030008	SEMI VARIABLE 22KOHM

SEMI-CONDUCTORS

D0201	5339071	DIODE 1SS119
D0202	5339071	DIODE 1SS119
D0402	5339071	DIODE 1SS119
D0602	5339071	DIODE 1SS119
D0700	5339071	DIODE 1SS119
D0702	5339071	DIODE 1SS119
D0703	5339071	DIODE 1SS119
D0704	5339071	DIODE 1SS119
D0705	5339071	DIODE 1SS119
D0706	5339071	DIODE 1SS119
D0707	5339071	DIODE 1SS119
D0714	5339071	DIODE 1SS119
D0715	5339071	DIODE 1SS119(M281A)
D0801	5339071	DIODE 1SS119
D0802	5339071	DIODE 1SS119(M281A)
D0803	5339071	DIODE 1SS119(M281A)
D1201	5339071	DIODE 1SS119
D1203	5339071	DIODE 1SS119(M181A)
D1204	5339071	DIODE 1SS119(M281A)
D1413	5339071	DIODE 1SS119
D1802	5339071	DIODE 1SS119(M281A)
△D0851	5339231	DIODE 1SR35-100A
△D0852	5339231	DIODE 1SR35-100A
△D0853	5339231	DIODE 1SR35-100A
△D0854	5339231	DIODE 1SR35-100A
△D0855	5339231	DIODE 1SR35-100A
△D0856	5339231	DIODE 1SR35-100A
△D0857	5339231	DIODE 1SR35-100A
△D0858	5339231	DIODE 1SR35-100A
D0859	5339171	DIODE 1SS130
D0860	5339171	DIODE 1SS130
D0861	5339071	DIODE 1SS119
D0862	5339071	DIODE 1SS119
D0863	5339231	DIODE 1SR35-100A
D1801	5339551	DIODE SS1J4
D2101	5380933	LED GL451
D3501	5339071	DIODE 1SS119
D3502	5339071	DIODE 1SS119
IC0201	1346761	IC HA11837ONT
IC0203	1362261	IC CXL5507P
IC0401	1341472	IC LA7297
IC0501	1360031	IC NJM2235S
IC0502	5366981	IC M5201L
IC0601	1345871	IC HD49781NT
IC0602	1347151	IC HA17558
IC0701	1366584	IC M38184M8-225FP
IC0702	5300794	IC BA6209U4
IC0703	1345903	IC PST600G
IC0864	1341511	IC M5F7805L
IC1401	1340784	IC M35010-085SP
IC1441	1361932	IC BA7046A
IC2101	5327521	PHOTO TRANSISTOR SPI-315-C
IC2102	5327521	PHOTO TRANSISTOR SPI-315-C
IC3551	1388911	LIGHT DETECTING UNITGP1U581X
Q0201	5327063	TRANSISTOR 2SC1740S
Q0202	5327063	TRANSISTOR 2SC1740S
Q0203	5327063	TRANSISTOR 2SC1740S
Q0204	5327063	TRANSISTOR 2SC1740S
Q0205	5327063	TRANSISTOR 2SC1740S
Q0206	5327063	TRANSISTOR 2SC1740S
Q0208	5327021	TRANSISTOR 2SA844CD
Q0211	5327021	TRANSISTOR 2SA844CD
Q0212	5327021	TRANSISTOR 2SA844CD
Q0214	5327063	TRANSISTOR 2SC1740S
Q0215	5327073	TRANSISTOR DTC144ES
Q0217	5327021	TRANSISTOR 2SA844CD
Q0219	5327073	TRANSISTOR DTC144ES
Q0220	5327073	TRANSISTOR DTC144ES
Q0221	5327063	TRANSISTOR 2SC1740S
Q0222	5327073	TRANSISTOR DTC144ES
Q0226	5327073	TRANSISTOR DTC144ES
Q0401	5327091	TRANSISTOR 2SD1504E
Q0402	5327073	TRANSISTOR DTC144ES
Q0403	5327091	TRANSISTOR 2SD1504E
Q0404	5327101	TRANSISTOR 2SC3553(B/C)
Q0405	5327091	TRANSISTOR 2SD1504E
Q0506	5327031	TRANSISTOR 2SA673(C)
Q0517	5327021	TRANSISTOR 2SA844CD
Q0520	5327073	TRANSISTOR DTC144ES
Q0601	5327063	TRANSISTOR 2SC1740S
Q0602	5327063	TRANSISTOR 2SC1740S
Q0603	5327073	TRANSISTOR DTC144ES
Q0751	5327063	TRANSISTOR 2SC1740S
Q0801	5327031	TRANSISTOR 2SA673(C)
Q0802	1321341	TRANSISTOR 2SD1765
Q0803	5327151	TRANSISTOR 2SA952-ML2
Q0804	5327073	TRANSISTOR DTC144ES
Q0805	5327073	TRANSISTOR DTC144ES

SYMBOL-NO	P-NO	DESCRIPTION
Q0861	1321341	TRANSISTOR 2SD1765
Q0862	1321341	TRANSISTOR 2SD1765
Q0863	5327063	TRANSISTOR 2SC1740S
Q0864	5327021	TRANSISTOR 2SA844CD
Q1201	5327063	TRANSISTOR 2SC1740S
Q1411	5327063	TRANSISTOR 2SC1740S
Q1412	5327063	TRANSISTOR 2SC1740S
Q1461	5327063	TRANSISTOR 2SC1740S
Q1462	5327063	TRANSISTOR 2SC1740S
Q1463	1320012	TRANSISTOR 2SA933A(R)
Q1464	5327063	TRANSISTOR 2SC1740S
Q1465	5327073	TRANSISTOR DTC144ES
Q1466	5327073	TRANSISTOR DTC144ES
Q2101	5324661	PHOTO TRANSISTOR PT-483F1H
Q2102	5324661	PHOTO TRANSISTOR PT-483F1H
△QF0851	5721946	IC PROTECTOR (N15)
△QF0852	5721946	IC PROTECTOR (N15)
ZD0700	5339462	ZENER DIODE HZS12A1
ZD0702	5339571	DIODE UTZ6.2B
ZD0703	5339262	DIODE HZS6-C2
ZD0704	5339262	DIODE HZS6-C2
ZD0801	5339274	DIODE HZS15-3
ZD0864	5339268	DIODE HZS11B2
ZD0867	5339255	DIODE HZS12-C3T
ZD1801	5339288	DIODE HZS30-3
ZD201	5339262	DIODE HZS6-C2
ZD202	5339262	DIODE HZS6-C2
T0403	5261531	COIL
△T0851	5214591	TRANSFORMER(HEPM)
TU1501	5582211	TUNER IF UNIT(HEPM)(M181A)
TU1501	5582221	TUNER IF UNIT(HEPM)(M281A)
L0201	5159149	CHOKE COIL 47UH
L0202	0770069	CHOKE COIL 820UH+-5%
L0203	5159156	CHOKE COIL 150UH
L0204	5159147	CHOKE COIL 33UH
L0206	5159144	CHOKE COIL 18UH
L0207	0770057	CHOKE COIL 100UH+-5%
L0210	0770057	CHOKE COIL 100UH+-5%
L0212	5159076	CHOKE COIL 82UH
L0214	0770057	CHOKE COIL 100UH+-5%
L0215	0770057	CHOKE COIL 100UH+-5%
L0217	5159152	CHOKE COIL 68UH
L0218	5159147	CHOKE COIL 33UH
L0220	5159152	CHOKE COIL 68UH
L0221	5159154	CHOKE COIL 100UH
L0223	5159153	CHOKE COIL 82UH
L0224	5159141	CHOKE COIL 10UH(M281A)
L0224	5159144	CHOKE COIL 18UH(M181A)
L0225	5159157	CHOKE COIL 180UH
L0227	5159067	CHOKE COIL 18UH
L0401	5159114	COIL 15MH
L0402	5159082	CHOKE COIL 220UH+-10%
L0504	5159077	CHOKE COIL 100UH+-10%
L0510	5159131	COIL 1UH
L0601	5159077	CHOKE COIL 100UH+-10%
L1201	5159077	CHOKE COIL 100UH+-10%
L1401	5159077	CHOKE COIL 100UH+-10%
L1402	5159141	CHOKE COIL 10UH
L1441	5159077	CHOKE COIL 100UH+-10%
L1801	5159073	CHOKE COIL 47UH+-10%
L1802	5159077	CHOKE COIL 100UH+-10%
X0201	5778291	CRYSTAL
X0702	5779111	CRYSTAL
X1401	5778312	CRYSTAL(HEPM)
BL0701	5272376	FILTER
CP0201	5165402	FILTER
CP0202	5165281	HIGHT PASS FILTER
CP0203	5163591	BAND PASS FILTER
DL0201	5786331	DELAY LINE
△F851	5722651	FUSE 1.6A
△F852	5722651	FUSE 1.6A
△F853	5721983	FUSE 3A
J2551	5674662	JACK, AV(HEPM)
JK0501	56S6032	JACK
S1501	5622562	SWITCH
S1701	5634884	SWITCH
S1702	5634884	SWITCH
S1703	5634884	SWITCH
S1707	5634884	SWITCH
S1708	5634884	SWITCH
S2101	5635631	SWITCH
S2102	5635331	SWITCH
S2104	5610891	SWITCH
S3501	5634884	SWITCH
S3502	5634884	SWITCH
S3503	5634884	SWITCH
V0751	5315431	FILTER

PRE AMP/HEAD SW SECTION(For VT-M181A)

CAPACITORS

C0001	0800185	ELECTROLYTIC 47UF 6.3V
C0002	0890044	CERAMIC DISC 0.022UF+80-20% 25V
C0003	0890046	CERAMIC DISC 0.1UF+80-20% 50V
C0004	0890044	CERAMIC DISC 0.022UF+80-20% 25V
C0006	0890044	CERAMIC DISC 0.022UF+80-20% 25V
C0007	0890045	CERAMIC DISC 0.047UF+80-20% 50V
C0008	0800187	ELECTROLYTIC 100UF 6.3V
C0009	0890043	CERAMIC DISC 0.01UF+-20% 16V
C0010	0890046	CERAMIC DISC 0.1UF+80-20% 50V
C0012	0890046	CERAMIC DISC 0.1UF+80-20% 50V
C0013	0890017	CERAMIC DISC 47PF+-5% 50V
C0014	0890016	CERAMIC DISC 39PF+-50% 50V
C0015	0890046	CERAMIC DISC 0.1UF+80-20% 50V
C0016	0800173	ELECTROLYTIC 0.33UF 50V
C0017	0890046	CERAMIC DISC 0.1UF+80-20% 50V
C0018	0890046	CERAMIC DISC 0.1UF+80-20% 50V
C0019	0890043	CERAMIC DISC 0.01UF+-20% 16V
C0020	0890036	CERAMIC DISC 1500PF+-20% 16V
C0021	0890013	CERAMIC DISC 22PF+-5% 50V
C0022	0890013	CERAMIC DISC 22PF+-5% 50V
C0023	0890046	CERAMIC DISC 0.1UF+80-20% 50V

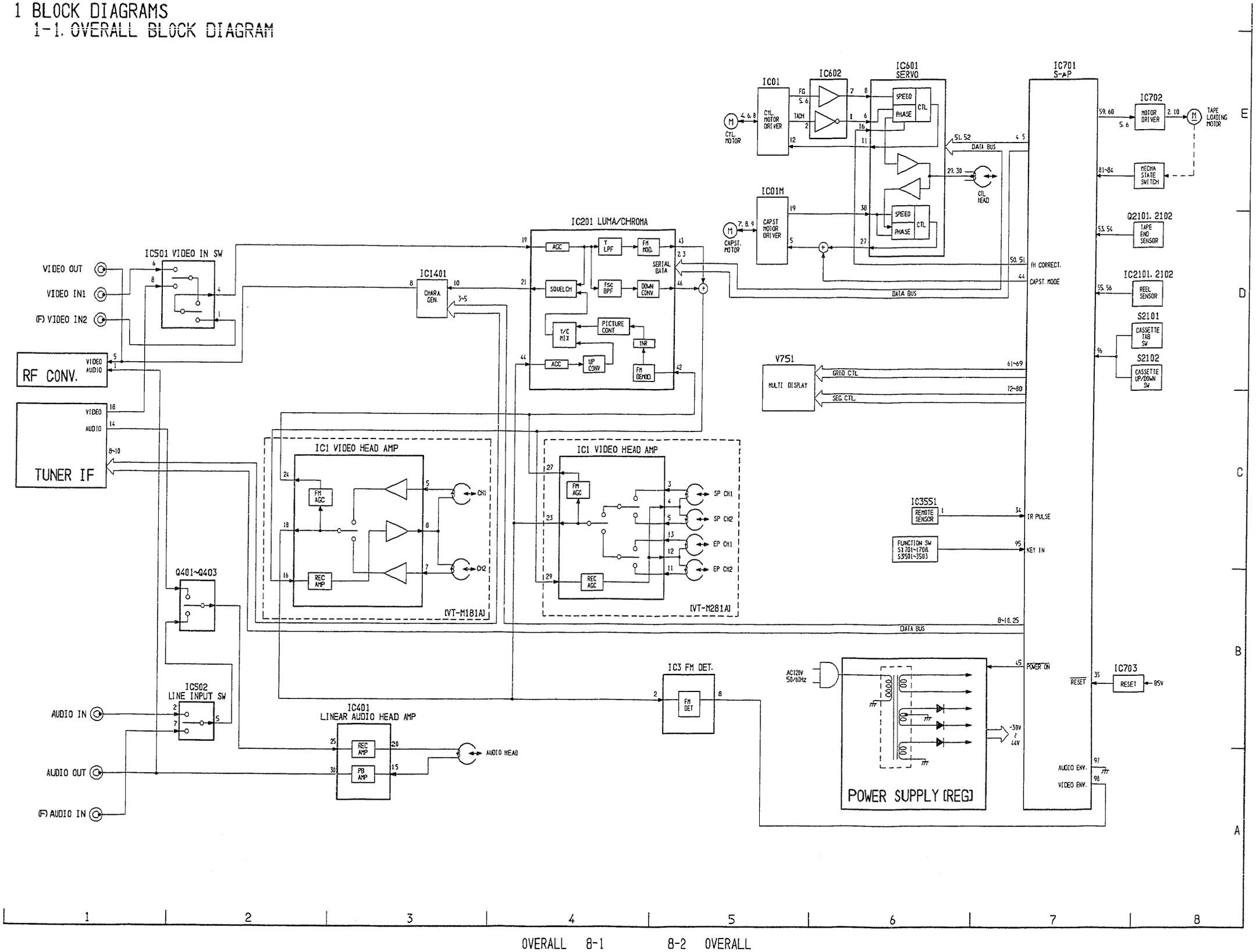
RESISTORS

R0001	0700058	CARBON FILM 22KOHM+-5% 1/8W
R0002	0700057	CARBON FILM 18KOHM+-5% 1/8W
R0003	0700032	CARBON FILM 220 OHM+-5% 1/8W
R0004	0700036	CARBON FILM 470 OHM+-5% 1/8W
R0005	0700037	CARBON FILM 560OHM+-5% 1/8W
R0006	0700036	CARBON FILM 470 OHM+-5% 1/8W
R0008	0700047	CARBON FILM 3.3KOHM+-5% 1/8W
R0009	0700064	CARBON FILM 56KOHM+-5% 1/8W
R0010	0700054	CARBON FILM 10KOHM+-5% 1/8W
R0011	0700061	CARBON FILM 33KOHM+-5% 1/8W
R0012	0700041	CARBON FILM 1.0KOHM+-5% 1/8W
R0013	0700027	CARBON FILM 100 OHM+-5% 1/8W
R0014	0700027	CARBON FILM 100 OHM+-5% 1/8W

SYMBOL-NO	P-NO	DESCRIPTION
		SEMI-CONDUCTORS
IC001	1346741	IC BA7182AS
Q0001	5327063	TRANSISTOR 2SC1740S
Q0002	5327063	TRANSISTOR 2SC1740S
Q0003	5327073	TRANSISTOR DTC144ES
Q0005	5327073	TRANSISTOR DTC144ES
		COILS
L0001	0770057	CHOKE COIL 100UH+-5%
L0002	0770057	CHOKE COIL 100UH+-5%
L0003	5159149	CHOKE COIL 47UH
		PRE AMP/HEAD SW SECTION(For VT-M281A)
		CAPACITORS
C01	0800186	ELECTROLYTIC 47UF 16V
C02	0890044	CERAMIC DISC 0.022UF+80-20% 25V
C04	0800173	ELECTROLYTIC 0.33UF 50V
C05	0890043	CERAMIC DISC 0.01UF+-20% 16V
C06	0890036	CERAMIC DISC 1500PF+-20% 16V
C07	0890045	CERAMIC DISC 0.047UF+80-20% 50V
C08	0890015	CERAMIC DISC 33PF+-50% 50V
C09	0890043	CERAMIC DISC 0.01UF+-20% 16V
C10	0890016	CERAMIC DISC 39PF+-50% 50V
C11	0800185	ELECTROLYTIC 47UF 6.3V
C12	0890029	CERAMIC DISC 390PF+-10% 50V
C13	0890044	CERAMIC DISC 0.022UF+80-20% 25V
C14	0800185	ELECTROLYTIC 47UF 6.3V
C15	0890044	CERAMIC DISC 0.022UF+80-20% 25V
C16	0800185	ELECTROLYTIC 47UF 6.3V
C17	0890044	CERAMIC DISC 0.022UF+80-20% 25V
C18	0890017	CERAMIC DISC 47PF+-5% 50V
C19	0890046	CERAMIC DISC 0.1UF+80-20% 50V
C20	0890046	CERAMIC DISC 0.1UF+80-20% 50V
C21	0890044	CERAMIC DISC 0.022UF+80-20% 25V
C22	0890044	CERAMIC DISC 0.022UF+80-20% 25V
C23	0890046	CERAMIC DISC 0.1UF+80-20% 50V
C24	0890046	CERAMIC DISC 0.1UF+80-20% 50V
C25	0890017	CERAMIC DISC 47PF+-5% 50V
C26	0890044	CERAMIC DISC 0.022UF+80-20% 25V
C27	0890043	CERAMIC DISC 0.01UF+-20% 16V
C28	0890044	CERAMIC DISC 0.022UF+80-20% 25V
C29	0800185	ELECTROLYTIC 47UF 6.3V
C30	0890013	CERAMIC DISC 22PF+-5% 50V
C31	0800173	ELECTROLYTIC 0.33UF 50V
C32	0890045	CERAMIC DISC 0.047UF+80-20% 50V
C59	0890046	CERAMIC DISC 0.1UF+80-20% 50V
C60	0890014	CERAMIC DISC 27PF+-50% 50V
C61	0890014	CERAMIC DISC 27PF+-50% 50V
C65	0890046	CERAMIC DISC 0.1UF+80-20% 50V
		RESISTORS
R01	0700045	CARBON FILM 2.2KOHM+-5% 1/8W
R02	0700037	CARBON FILM 560OHM+-5% 1/8W
R03	0700032	CARBON FILM 220 OHM+-5% 1/8W
R04	0700045	CARBON FILM 2.2KOHM+-5% 1/8W
R05	0700038	CARBON FILM 680OHM+-5% 1/8W
R06	0700027	CARBON FILM 100 OHM+-5% 1/8W
R07	0700041	CARBON FILM 1.0KOHM+-5% 1/8W
R09	0700032	CARBON FILM 220 OHM+-5% 1/8W

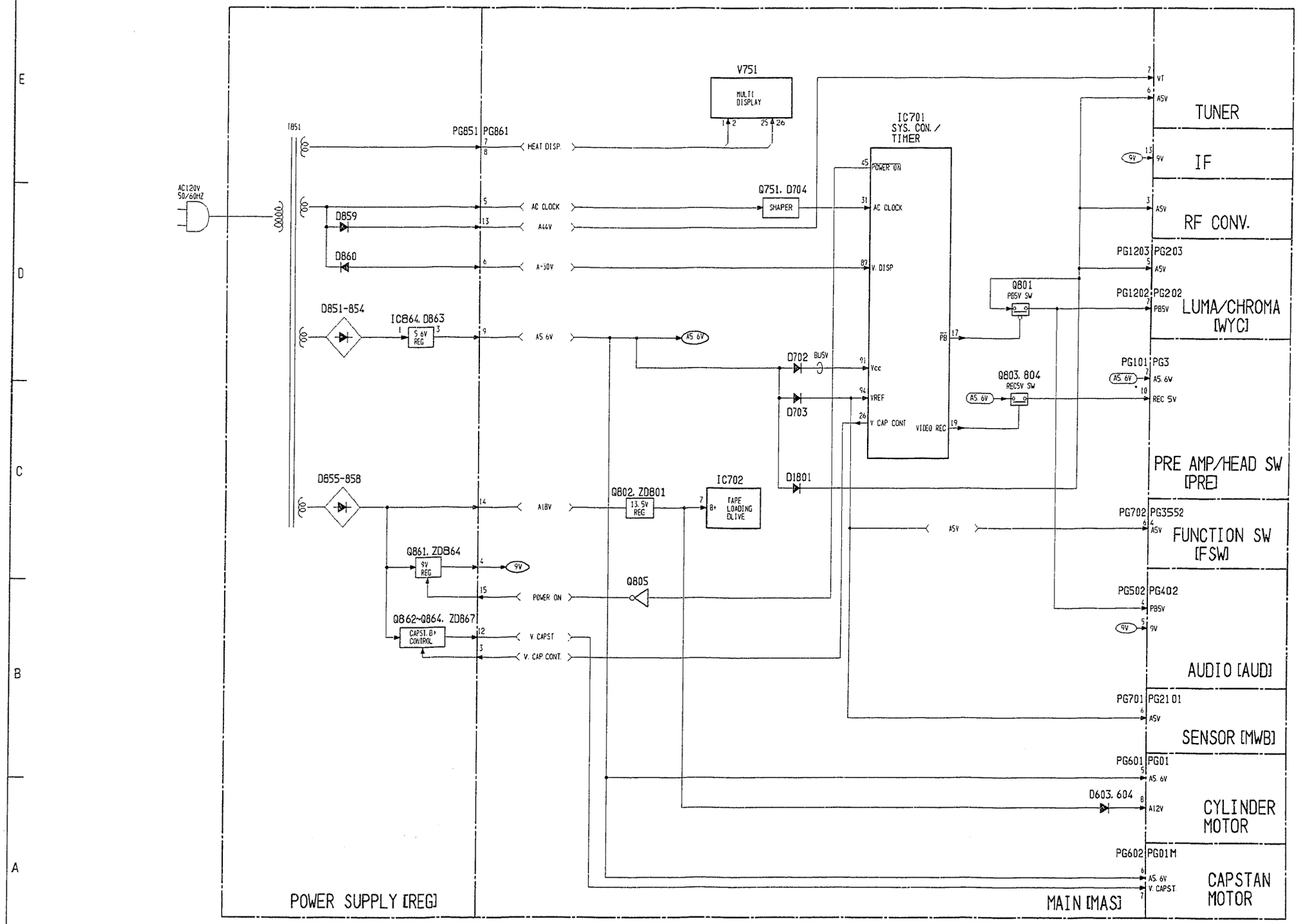
SYMBOL-NO	P-NO	DESCRIPTION
R10	0700027	CARBON FILM 100 OHM+-5% 1/8W
R11	0700036	CARBON FILM 470 OHM+-5% 1/8W
R12	0700019	CARBON FILM 27 OHM+-5% 1/8W
R13	0700033	CARBON FILM 270OHM+-5% 1/8W
R14	0700027	CARBON FILM 100 OHM+-5% 1/8W
R15	0700027	CARBON FILM 100 OHM+-5% 1/8W
R16	0700019	CARBON FILM 27 OHM+-5% 1/8W
R17	0700033	CARBON FILM 270OHM+-5% 1/8W
R18	0700036	CARBON FILM 470 OHM+-5% 1/8W
R19	0700027	CARBON FILM 100 OHM+-5% 1/8W
R20	0700027	CARBON FILM 100 OHM+-5% 1/8W
R21	0700027	CARBON FILM 100 OHM+-5% 1/8W
R22	0700054	CARBON FILM 10KOHM+-5% 1/8W
R23	0700054	CARBON FILM 10KOHM+-5% 1/8W
R24	0700042	CARBON FILM 1.2KOHM+-5% 1/8W
R25	0700052	CARBON FILM 6.8KOHM+-5% 1/8W
R26	0700061	CARBON FILM 33KOHM+-5% 1/8W
R28	0700042	CARBON FILM 1.2KOHM+-5% 1/8W
R29	0700027	CARBON FILM 100 OHM+-5% 1/8W
R31	0700054	CARBON FILM 10KOHM+-5% 1/8W
R62	0700041	CARBON FILM 1.0KOHM+-5% 1/8W
R63	0700042	CARBON FILM 1.2KOHM+-5% 1/8W
		SEMI-CONDUCTORS
D01	5339131	DIODE 1SS254
IC01	1362321	IC HA118162NT
IC04	1362761	IC BA7048N
Q01	5327063	TRANSISTOR 2SC1740S
Q03	5327063	TRANSISTOR 2SC1740S
Q04	5327063	TRANSISTOR 2SC1740S
Q05	5327063	TRANSISTOR 2SC1740S
Q06	5327073	TRANSISTOR DTC144ES
Q07	5327073	TRANSISTOR DTC144ES
L01	0770057	CHOKE COIL 100UH+-5%
L02	5159149	CHOKE COIL 47UH
L03	5159148	CHOKE COIL 39UH
L04	0770057	CHOKE COIL 100UH+-5%
L05	0770057	CHOKE COIL 100UH+-5%
L06	0770057	CHOKE COIL 100UH+-5%
L07	5159154	CHOKE COIL 100UH
L08	5159154	CHOKE COIL 100UH
L09	0770057	CHOKE COIL 100UH+-5%
L10	5159148	CHOKE COIL 39UH
L15	5159147	CHOKE COIL 33UH
L16	5159147	CHOKE COIL 33UH

APPENDIX
1 BLOCK DIAGRAMS
1-1. OVERALL BLOCK DIAGRAM

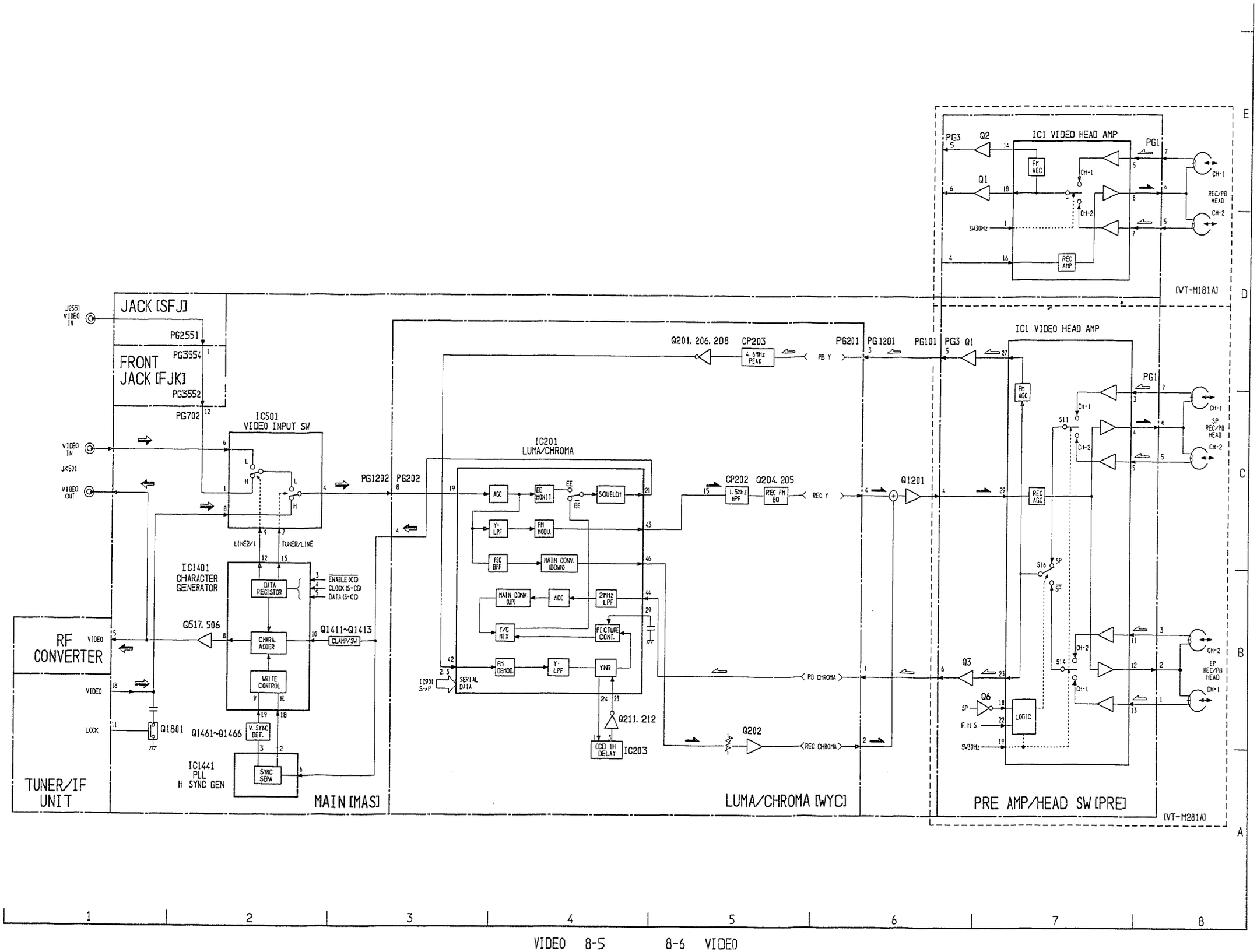


OVERALL 8-1 8-2 OVERALL

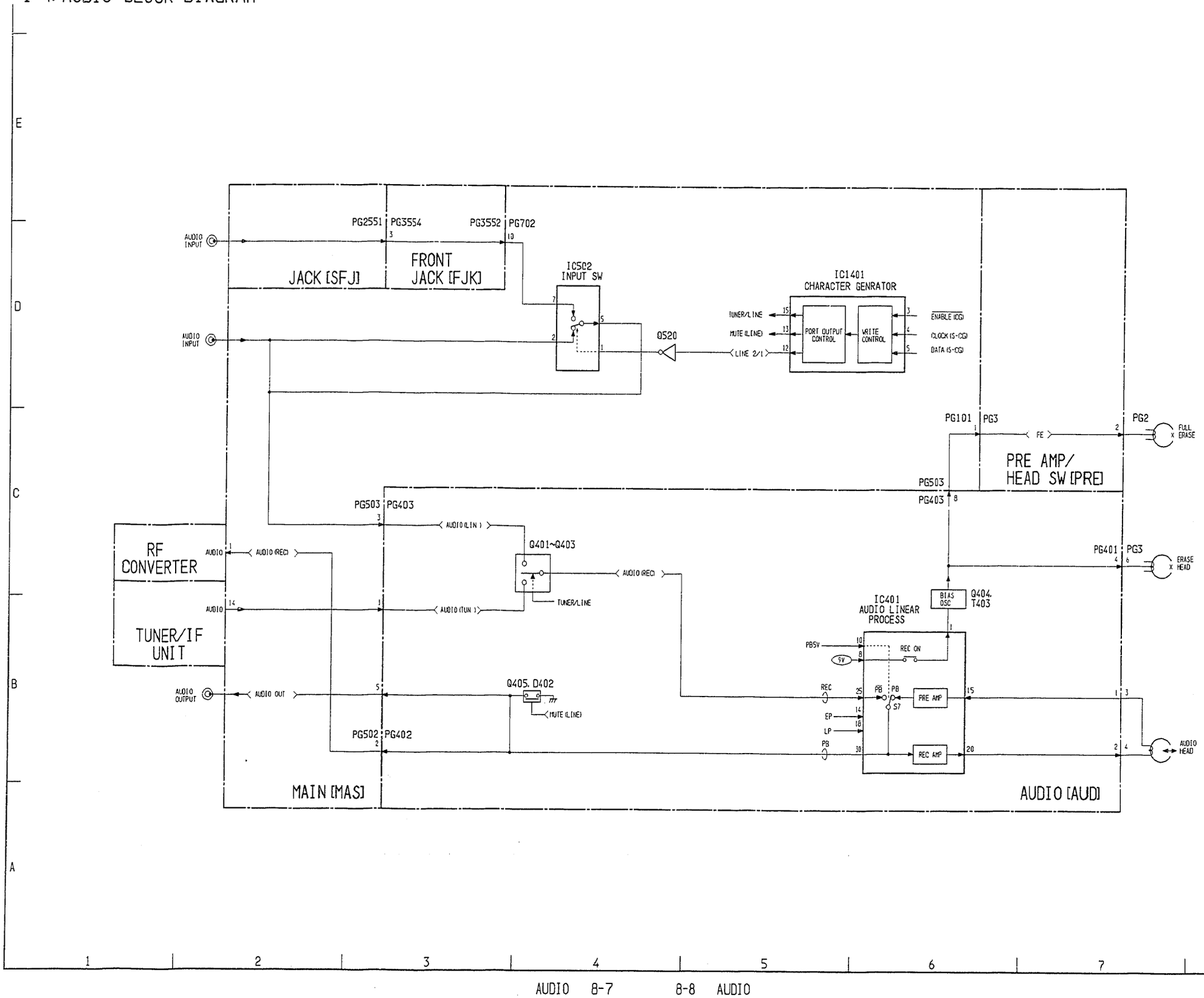
1-2. POWER SUPPLY BLOCK DIAGRAM



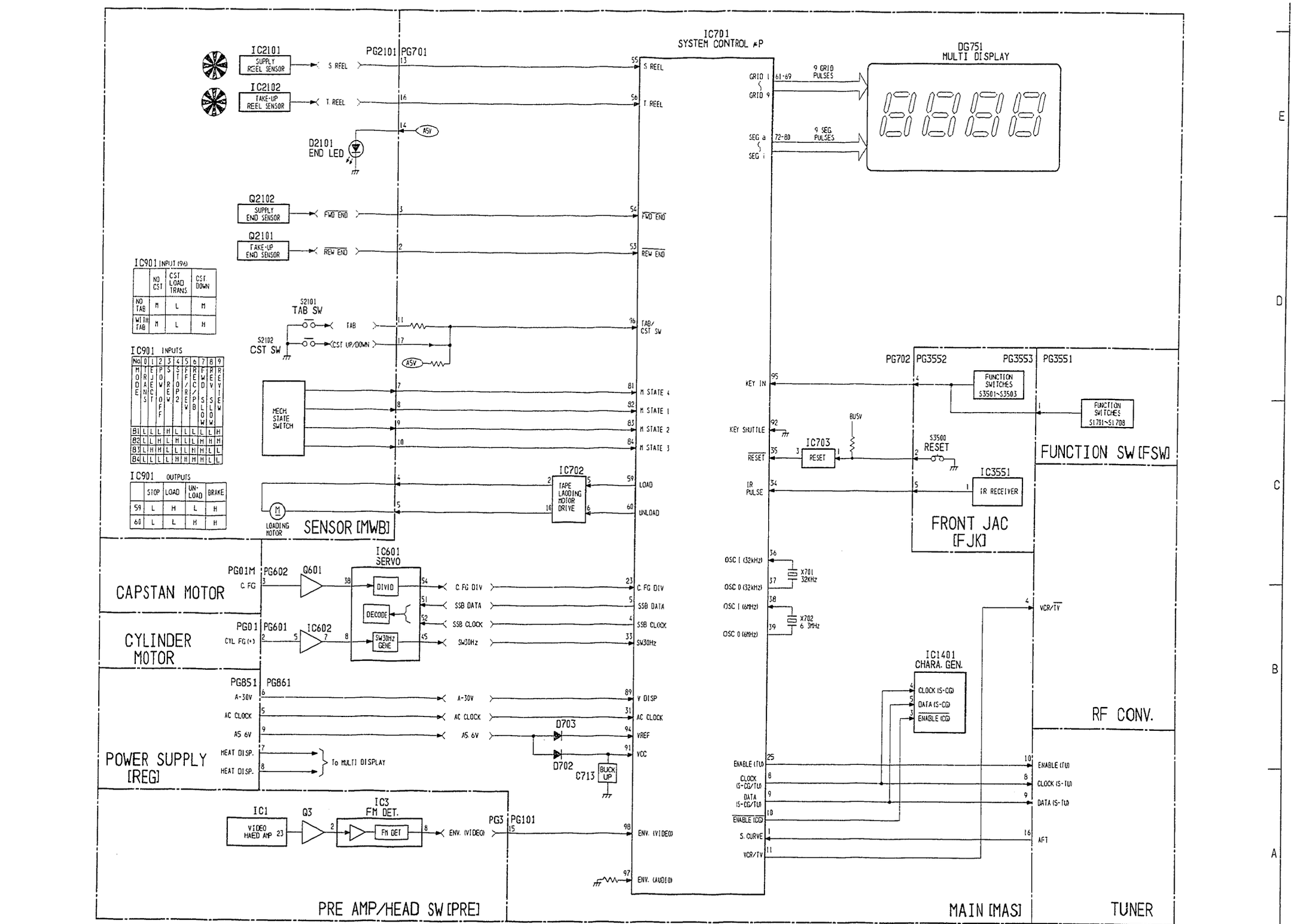
1-3. VIDEO BLOCK DIAGRAM



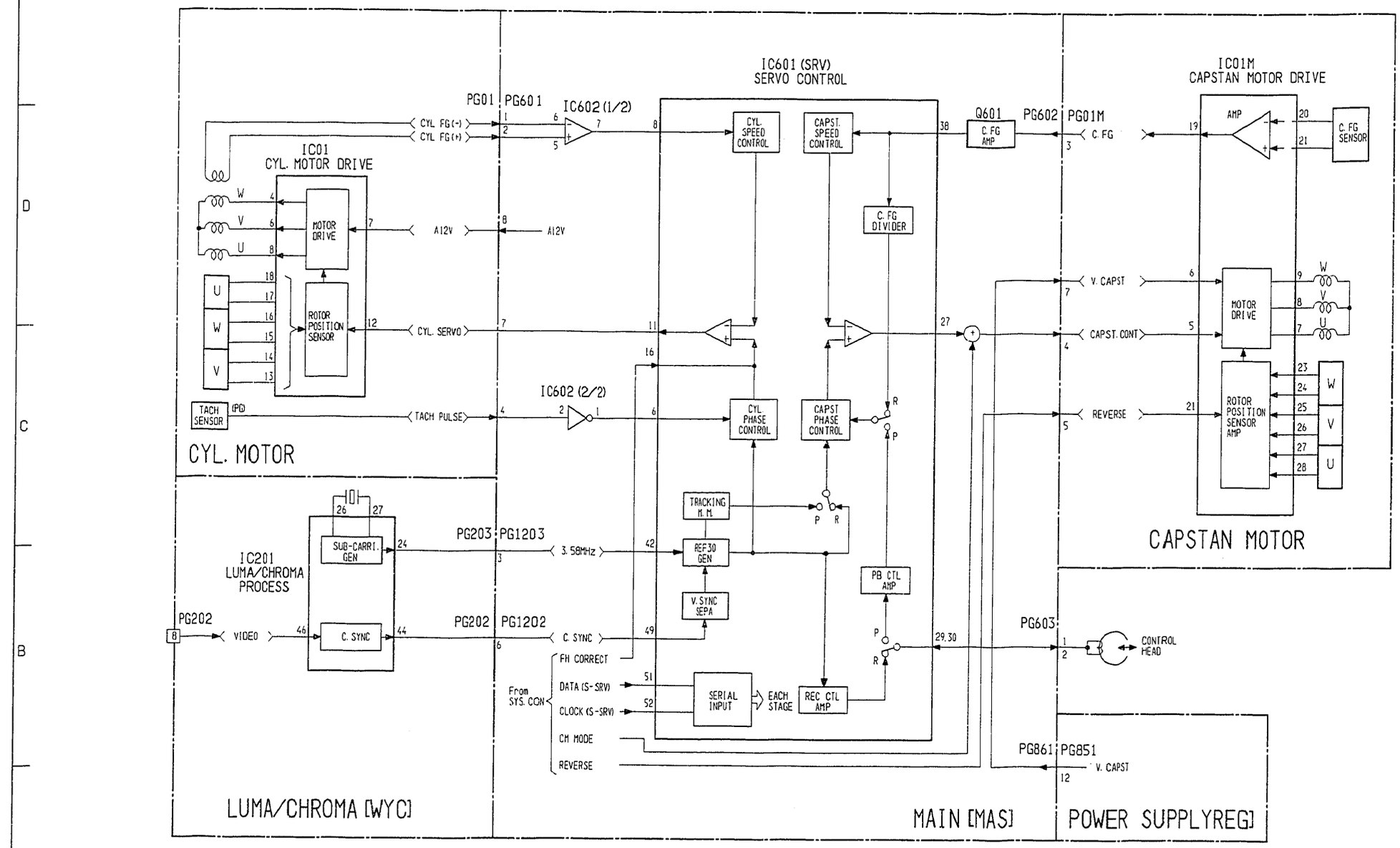
1-4. AUDIO BLOCK DIAGRAM



1-5. SYSTEM CONTROL BLOCK DIAGRAM



1-6. SERVO BLOCK DIAGRAM



2. MICROPROCESSOR PIN FUNCTION TABLE

SYSTEM CONTROL μP (IC701) PIN FUNCTIONS

Pin No.	I/O	Active Level	Abbreviation	Function
1	I	A/D	S.CURVE	Detects the variation of the AFT (S.CURVE) voltage applied from the IF unit to tune the station correctly.
2	I	-	NC	
3	O	-	NC	
4 5	O O	Pulse Pulse	SSB CLOCK SSB DATA	These are the data bus lines between the S-μP and SERVO and VIDEO ICs. The data is sent to these ICs with Serial Signal Bus system.
6	I	Hi	CLOCK FAST	Fixed to Lo.
7	O	-	NC	
8 9	O O	Pulse Pulse	CLOCK(S-CG/TU) DATA(S-CG/TU)	This is a common data bus lines between the S-μP and each of 2 ICs (tuner and character generator IC). The data is sent to the selected IC synchronized with clock signal after the reception IC is selected by enable outputs at pins 25 and 10.
10 25	O O	Lo Hi	ENABLE(CG)(Lo) ENABLE(TU)	Selects the data reception IC. A common data line is provided between the S-μP and each IC (TU IC and character IC). When sending the data, the μP sets the enable line to active level until the data transfer is completed.
11	O	Hi/Lo	VCR/TV	When the VHF RF switch is set to "VCR", the RF modulator's output is selected and applied to the VHF output jack on the rear panel. Conversery when the VHF RF switch is set to "TV", the VHF antenna's output is selected.
12 13	O I/O	Pulse Pulse	CLOCK (S-ROM) DATA (S-ROM)	Data transfer lines between S-up and EAROM. Pin 13 is Bi-directional port.
14 15 16	O O O	Hi Hi Hi	EP LP SP	Tape speed mode output.
17	O	Lo	PB(Lo)	Sets the video and audio circuits to play.
18	O	-	NC	
19	O	Hi	VIDEO REC	Controls the REC 5V regulator.
20	O	Hi	AUDIO REC	Sets the Audio circuit to recording mode and controls the full erase osc circuit.
21	O	-	NC	
22	O	-	NC	
23	I	Pulse	C.FG DIV.	Monitors whether or not the slack is rewound to the supply reel disk during eject. The C.FG pulses are also utilized as clock signal to measure the amount of the backspace during record-pause.
24 30	I I	Pulse Pulse	CTL(COUNT)(Lo) CTL(SLOW)(Lo)	Inputs CTL DIV. pulses in order to calculate the linear time counter. Inputs CTL DIV. pulses in order to process the slow mode.
26	O	PWM	V.CAP CONT	Controls the B+ voltage of the capstan motor driver IC according to the VCR operation mode.
27	O	-	NC	
28	O	-	NC	
29	O	-	NC	
31	I	Pulse	AC CLOCK	Utilized as a clock pulse for time count and is also used to detect power failure.
32	I	Pulse	TRACK.TRIG.	Tracking mono-multi signal input from SEARVO IC. Utilized for processing the tracking control and detecting the power line short circuited.
33	I	Pulse	SW30Hz	Monitors the frequency of SW30Hz to detect that the cylinder motor rotates correctly during record and play. The SW30Hz signal is also used to control supplying the video signals to the heads.
34	I	Pulse	IR PULSE	Decodes the IR remote code from the IR transmitter and places the VCR in the commanded mode.
35	I	Lo	RESET (LO)	Initializes the μP when the μP is powered.
36 37	I O	— —	OSC I(32kHz) OSC O(33kHz)	Generates a 32.768 kHz clock signal for the timer during backup mode.
38 39	I O	— —	OSC I(6.3MHz) OSC O(6.3MHz)	Generates a 6.3MHz clock signal which is utilized as the main system clock signal in modes other than backup mode.
40	-	-	Vss	Connected to Ground.

Pin No.	I/O	Active Level	Abbreviation	Function
41	0	-	NC	
42	0	-	NC	
43	0	Hi	REVERSE	Sets the capstan rotation direction to reverse.
44	0	Hi/Mi/Lo	CM MODE	Selects the capstan motor operation mode. "Hi":REEL mode, "Mi":SERVO mode, "Lo":BRAKE mode. During "Hi", this controls the capstan motor instead of the SEARVO IC output in other than PB/REC/SEARCH modes.
45	0	Lo	POWER ON (Lo)	Controls the 9V regulator when the power switch is pressed or when a cassette is inserted or a malfunctions occur.
46	I	Lo	DUTY (Lo)	INDEX signal input. "Lo" when INDEX signal is detected.
47	0	-	NC	
48	-	-	NC	
49	I	Lo	SYNC. DET (Lo)	When a "Lo" is applied during channel selection mode, μP detects the presence of the object channel and enters the fine tuning operation mode.
50	0	Hi/Mi/Lo	fH CORRECT 1	Horizontal jitter correction signal in slow mode.
51	0	Hi/Mi/Lo	fH CORRECT 2	1 is for forward direction mode and 2 is for reverce.
52	0	Hi/Mi/Lo	FIELD HEAD SW	Outputs the video head switching signal during trick play mode. "Hi": SEARCH, "Mi":slow/still and "Lo":normal playback.
53	I	Lo	FWD END (Lo)	Releases the instrument from the commanded mode when "Lo" pulse is applied from the end sensor on the mechanism. Each sensor is responsible for monitoring the ends of tape. In addition both end sensors are also responsible for monitoring that no cassette is present.
54	I	Lo	REW END (Lo)	
55	I	Pulse	S.REEL	Monitor the both reel rotating frequency to detect the reel lock condition. These reel pulses are also utilized for counting the tape remaining time.
56	I	Pulse	T.REEL	
57	0	Hi	REC MUTE	Inhibits supplying the video signal to the video head during transient period in recording mode.
58	0	Hi	CURRENT UP	Outputs "Hi" to increase the video recording level for 5/15 seconds in SP/EP tape speed after assemble mode is released.
59	0	Hi	LOAD	Controls the loading motor to place the mechanism state in mode corresponding to the commanded mode.
60	0	Hi	UNLOAD	
61	0	Pulse	GRID (9)	Drives the multi-function digital display dynamically synchronized with the segment control signals at pins 72 through 80.
62	0	Pulse	GRID (8)	
63	0	Pulse	GRID (7)	
64	0	Pulse	GRID (6)	
65	0	Pulse	GRID (5)	
66	0	Pulse	GRID (4)	
67	0	Pulse	GRID (3)	
68	0	Pulse	GRID (2)	
69	0	Pulse	GRID (1)	
70	0	-	NC	
71	0	-	NC	
72	0	Pulse	SEGMENT (i)	Drives the multi-function digital display dynamically synchronized with the grid control signals at pins 61 through 69.
73	0	Pulse	SEGMENT (h)	
74	0	Pulse	SEGMENT (g)	
75	0	Pulse	SEGMENT (f)	
76	0	Pulse	SEGMENT (e)	
77	0	Pulse	SEGMENT (d)	
78	0	Pulse	SEGMENT (c)	
79	0	Pulse	SEGMENT (b)	
80	0	Pulse	SEGMENT (a)	
81	I	Hi/Lo	M. STATE 4	Detects the mechanism state position to control the loading motor. Refer to the truth table in the Block diagram.
82	I	Hi/Lo	M. STATE 1	
83	I	Hi/Lo	M. STATE 2	
84	I	Hi/Lo	M. STATE 3	
85	0	Lo	EDIT OUT(Lo)	Edit control output for controling the recording VCR ON/OFF.
86	I	Lo	EDIT IN(Lo)	Camera pause input "Lo"; REC PAUSE mode.
87	I	Hi	TEST	Set the TEST mode.

Pin No.	I/O	Active Level	Abbreviation	Function
88	0	Hi	TRICK PLAY	Disables the H correlative noise canceller in the video circuit during search and still. Shifts the peaking frequency of the 4.6MHz peaking circuit in the video circuit to 4.2MHz.
89	-	-	V.DISP	Supplied with -30V power source for driving the multi-function digital display.
90	I	Pulse	MODEL SELECT	Selects the type of model according to the input signals from Seg.a to h.
91	-	-	VCC	Connected to BU5V.
92	I	A/D	SHUTTLE IN	Shuttle ring operation input. Selects one of following 10 modes according to the input signals from Seg.a~Seg.d. 1.STILL or PLAY, 2.SLOW, 3.PLAY, 4. 2×PLAY, 5.FOWARD SEARCH, 6.REVERSE PLAY, 7.REVERSE 2×PLAY, 8.REVERSE SEARCH, 9.FAST FOWARD, 10.REWIND. This is not used in these models.
93	-	-	AVSS	Connected to GND.
94	-	-	VREF	The refference voltage of the A/D converter. Connected to 5V.
95	I	A/D	KEY IN	Receives one of 16 voltages corresponding to the pressed key on the front pannel. When no key is pressed, this pin is kept at "Hi". When a key is pressed, the divider corresponding to the pressed key is active and a divided voltage is produced. Then the μP digitizes this divided voltage to detect the pressed key.
96	I	Hi/Mi/Lo	TAB/CST.SW	Detects whether or not the record prevention tab which is located on the cassette is removed. With no tab, recording is inhibited or cassette is ejected automatically when the timer recording is set. Detects the cassette holder swtch with "Hi" and "Lo" level. Refer to the blockdiagram.
97	I	A/D	ENVEL. (AUDIO)	Audio Envelope input for Auto tracking. (not used in this model.)
98	I	A/D	ENVEL. (VIDEO)	Video Envelope input for Auto tracking.
99	I	-	NC	
100	I	-	NC	

Remote Control Buttons

POWER
Turns the VCR on and off.

VCR1, TV, CATV, VCR2
Device buttons let you set the remote to control one of four devices.

MUTE (TO CONTROL TV)
Turns off the audio until you press Mute again.

VOLUME/SLOW
Increase or decrease the audio volume and plays back in adjustable slow motion.

REW
Rewinds the videotape.

PLAY
Starts playing a loaded videocassette.

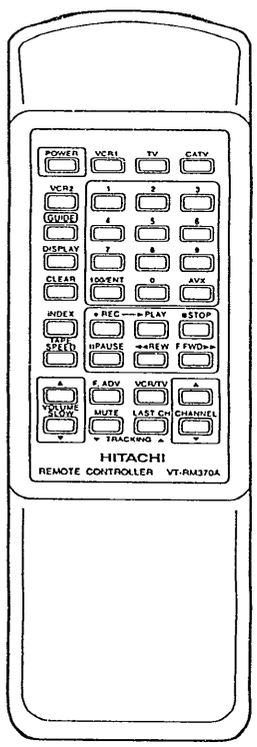
STOP
Stops a videocassette from playing, recording, pausing, rewinding—or anything it is doing.

GUIDE
Brings up an on-screen setup and programming guide, the Easy Graphic Menu.

TAPE SPEED
Switches between standard play (SP) and extended play (EP).

AVX
Used for recording from an auxiliary input such as a stereo system.

INDEX
Used for marking and searching for specific tape locations.



LAST CHANNEL
(TO CONTROL TV)
Switches to the channel you watched previously during the current viewing session.

CHANNEL
Top button switches to the next higher channel, bottom button switches to the next lower channel. For these to operate, you must have preset your channels.

REC
Starts recording on the station the VCR is set to. (Press REC and PLAY at the same time.)

F.FWD
Fast forwards the videotape.

PAUSE
Temporarily stops the cassette from recording or playing. Press PAUSE again (or PLAY) to resume.

F.ADV
Lets you advance the tape frame by frame.

CLEAR
Used in on-screen programming and indexing.

DISPLAY
Used in on-screen programming and indexing.

TRACKING
Lets you fine tune the picture.

0 to 9
Number buttons used in on-screen programming. Can also be used to change channels. (Simply press 2 or 3 digits for the channel you want—such as 0 and 6 for channel 6, or 100/ENT and 2 and 4 for channel 124.)

VCR/TV
Switches between viewing through the VCR and not viewing through the VCR.

When the Remote Doesn't Work Right

Check out these possibilities:

Low Battery

If the remote is not working even at close range, try putting in two fresh AA batteries.

Objects in the Way

There may be objects between the remote and the VCR—for instance, a stack of books on the coffee table, your 2-year-old child or the dog. Hold the remote so that it points at the VCR with nothing in the way.

Set to Wrong Device

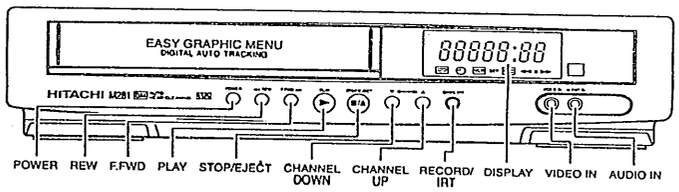
It may be set to VCR2 when you're trying to control VCR1. To confirm that this is the case, try pressing VCR2 and a function button (like channel up or down). If the remote works now, you know that it's set to VCR2. To reset it to VCR1, refer to the on-screen Initial Setup options.

If You Just Want to Watch TV

For normal TV viewing, you do not need to disconnect the VCR. When the TV and VCR are already on, press POWER on the remote control. The VCR will shut off, but the TV will stay on.

If you are recording on the VCR but want to watch a different channel on the TV, press the TV/VCR button to switch back and forth between the TV channel and the recording channel.

VCR Controls



POWER	Turns VCR power on and off.
STOP/EJECT	Cancels any videotape action, and when pressed a second time, ejects tape.
PLAY	Plays the loaded videotape.
DISPLAY	Shows time, channel, and status indicators.
CHANNEL	Up and down arrows for selecting channels.
REC/IRT	To begin recording.
F.FWD	Controls the videotape's forward motion.
REW	Controls the videotape's rewind motion.
VIDEO IN	Receives video signal from a video camera or another VCR.
AUDIO IN	Receives audio signal from a video camera, stereo system or another VCR.

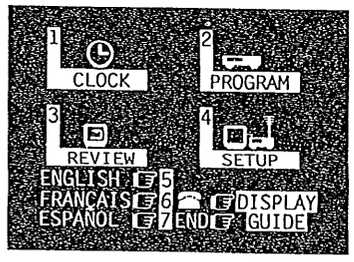
Display Indicators

Watch for these signs and symbols that let you know that the VCR is responding to your instructions.

OO	Cassette Loaded
REC	Recording
◄◄	Rewind
►►	Fast-Forward
►	Playback
II	Pause
II►	Slow-Motion Play
VCR	VCR Mode
EP	Extended Play.
SP	Standard Play
🕒	Programmed to Record Later
L1	Signal Being Received Through Audio/Video Input Jacks on Back of Unit.
L2	Signal Being Received Through Audio/Video Input Jacks on Front of Unit.

Meet Your On-Screen Guide

Your Hitachi VCR has a special feature called the Easy Graphic Menu. This feature guides you through simple setup and programming tasks right on the TV screen.
With the TV and VCR turned on, press GUIDE on the remote control. You will see this screen:



You may view all the on-screen instructions in English, French, or Spanish. When you first set up your VCR, it will be set to English. Press numbers 6 or 7 for the other language options.

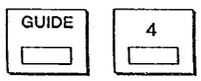
You will do most of your programming and setup by pressing numbers on the remote control which correspond to options presented in this and other on-screen menus. Instructions are easy to follow, and blinking spaces on the screen will show you where your input is needed.

- When you want to leave the Easy Graphic Menu, simply press GUIDE several times. This will back you out to the normal TV viewing screen.
- If you don't press any button for a while, the VCR will switch you back to an earlier screen or to regular TV viewing.

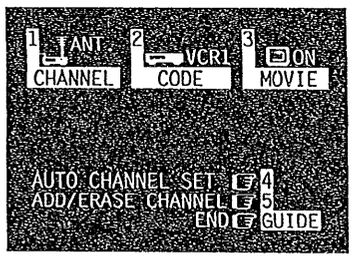
• Setup for First-Time Operation

Before you use your VCR to watch or record from your TV, you need to "tell" the VCR whether your TV uses cable or antenna input and let it program itself to receive your TV's channels. It's also a good idea to set the clock so you can do timed recordings later. With your TV and VCR hooked up, turn them both on and follow these steps using the remote control.

Setup Options



Press GUIDE, then press 4 to bring up the Setup screen.



At the screen are the default settings on your VCR. The default settings are the ones that are preset at the factory. They come up on the VCR every time the power goes out for more than 1 minute—for example, during a storm or when you unplug the VCR.

Look at each item to see if it matches your own setup:

- To change a setting, press the button that has the same number as that item. This will cycle you through several options.
- When everything is set up as you want, press GUIDE again to back out of the Easy Graphic Menu.

You need to set items 1 and 2 the first time you set up your VCR and any time you have a lengthy power interruption. The rest of the items can be set later as needed.

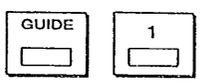
Here are what the options mean:

1 CHANNEL	Press 1 to select the type of receiving setup you have: ANT. Internal or external antenna CATV1 Ordinary cable CATV2 Alternate cable (if CATV1 doesn't give you the channels you expect)
2 CODE	Press 2 to enable the remote control to control a second VCR. Options are VCR1 and VCR2.
3 MOVIE RETURN	Press 3 to select whether you want prerecorded movies (safety tab removed) to play automatically when loaded, and then rewind, eject, and turn off the power when the movie is over and no prerecorded signals exist. Options are ON and OFF.
4 AUTO CHANNEL SET	Press 4 to automatically program the VCR to receive all the channels that come in on your antenna or cable.
5 ADD/ERASE CHANNEL	Press 5 to bring up a screen that lets you add new channels or limit the channels to the ones you most often watch.

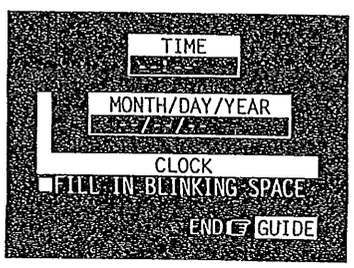
Setting the Clock

This is easy to do and important for your later timed recordings. You'll need to set the clock when first hooking up your VCR, and any time the power goes out more than 1 minute.

When you first plug in the VCR or after a power interruption, the clock display will read "--:--".



To set the clock, press GUIDE, then press 1 to bring up the Clock Set screen:



Press the number buttons on the remote control to set the current time—two digits for the hour and two for the minutes. Then press 1 or 2 for AM or PM, respectively.

For example, if it is now 2:15 PM, press 0, 2, 1, and 5 for hours and minutes, and press 2 for PM.

Continue pressing buttons to set the date. For example, if today is DECEMBER 25, 1995, press 1, 2, 2, 5, 9, and 5 to get 12/25/95.

When you're done, press GUIDE twice to return to regular viewing.

Now the display on the VCR will show the correct time.

Tips

- The item to be changed will blink on the screen as you go.
- The clock uses the 12-hour system. You set it for AM or PM.
- An illogical time (like 13 for the hour or 20 for the month) will not be accepted. A question mark displays instead of the illogical number.
- If you press the wrong digit, exit the screen by pressing GUIDE and recall the screen to enter the correct setup.
- The day of the week is set automatically.

More About Channel Selections

Your VCR is capable of receiving 68 broadcast TV channels (VHF 2–13, UHF 14–69) and 125 cable channels (CATV 1–125).

When you press 4 on the Setup screen, the tuner automatically cycles through all available channels in your area and places them in memory. This takes 2–3 minutes. You can watch the progress on the VCR's display—when the channel numbers stop changing, programming is complete. Only when the power goes out for more than 1 minute do you need to preset the channels again.

- In some areas channels cannot be switched when CATV1 is selected. Then, select CATV2 in your Setup screen.
- For convenience, the TV channel numbers should match those programmed into the VCR. If your TV has automatic channel programming, set it on the same mode—ANT, CATV1, or CATV2—and let it reprogram to match the VCR.

Once channels are preset, you can use the up and down CHANNEL buttons to move through the active channels. Or you can press the number buttons to move quickly between channels that are far apart.

Removing Channels

You may not want to keep all the stations the auto-programmer selects, since you may prefer to have only a few favorite channels in the tuner's memory. Or, you may want to delete from memory a weak or unused channel that the tuner picked up.

- Erased channels cannot be selected by the up and down CHANNEL SELECT buttons but can still be selected by using the numbered buttons 0 to 9 and 100/ENT.

Adding Channels

Occasionally the auto-programming may skip an active channel because the antenna was pointed in the wrong direction or the channel had a weak signal or was "off the air" at the time of programming. Or you may change your mind about a channel you removed from memory.

To Add or Erase Channels

- Press GUIDE, then press 4 to bring up Setup screen. Item 5 in setup screen lets you add or delete channels. Use the number buttons to enter the channel you want to change, then press STOP to delete it or press PLAY to add it.

Caution After a Power Failure

If a power failure lasting for more than 1 minute occurs, reset the clock and perform the "AUTO CHANNEL SET" found in the "SET-UP" menu.

• About Videocassette Tapes

Types

The best thing you can do for your VCR is use the best quality tapes available. This VCR uses VHS tapes only, which are the most common type. Look for the VHS mark on new or prerecorded tapes you buy.

Tapes are marked either T-120 or T-160, which signifies how many minutes of programming they can hold at standard recording speed (SP). To get the best quality picture, record at standard speed. But if you want to get more on a tape and are less concerned about the quality, set the VCR for extended play (EP).

Tape Capacities at Different Speeds

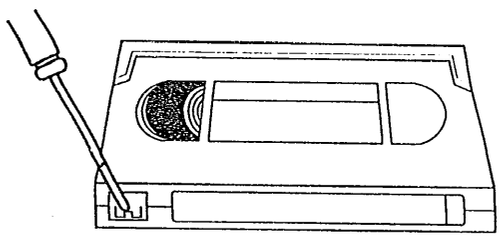
TYPES	RECORDING TIME	
	SP	EP
T-120	120 min.	360 min.
T-160	160 min.	480 min.

You may have noticed that there is also an LP speed. Your Hitachi VCR does not record at this speed, but it can play cassettes that were recorded in LP mode. No special setting is required for playback.

Safety Tabs Prevent Erasure

A safety tab is located on the front left edge of every videotape next to the label. Break this tab off if you want to keep a special tape from being erased accidentally. (Notice this tab is already removed on prerecorded tapes you buy or rent.) Insert the tip of a screwdriver or similar kind into the space behind the tab to break it off.

Don't worry, you can change your mind and record on this tape even after the tab is broken off—simply cover the hole with cellophane tape.



If the TV channel still doesn't change after going through all the button combinations listed, it is likely that you will not be able to program this remote control for your TV.

TV Brands	Press TV and This Number
Hitachi	1
Zenith	2
Sony	3
Magnavox	4
Sanyo	5
Gold Star 1	6
Toshiba	7
Gold Star 2	8
NEC	9
RCA	0
Panasonic	CHANNEL (up arrow)
Mitsubishi	CHANNEL (down arrow)
JVC	100/ENT
Sharp	LAST CH

Controlling the TV

Once programmed, the VCR's remote control is ready to control the TV.

- First press TV to change to the TV function mode, then press the button of the TV function that you want.

For example, press TV and the CHANNEL up arrow, and the TV station will change to the next higher station.

- Press VCR1 to operate your VCR with the remote again.

Be aware that not all of your TV's functions may work even though the remote control is correctly programmed.

Advanced Operations

This section explains how to use the VCR's remote control to operate your TV. It also shows you how to hook up a cable box and how to connect a second VCR for a complete home entertainment system.

• Controlling Your TV with the VCR's Remote

Compatibility

The remote control is designed to be compatible with many televisions and cable converters, but will not with every one made. If your TV or cable box does not respond the way it should when you program it as explained below, this remote may be incapable of operating it.

Once you have programmed the remote, you won't have to do it again until you change the batteries.

This Hitachi remote control can be used with your TV as well as the VCR, as long as your TV comes with a remote control. This feature comes in handy—you don't have to juggle two remotes.

The remote control is compatible with the fourteen makes of TVs listed next page—but don't be alarmed if yours is not on our list. You may still be able to program the remote for your TV.

Every TV that comes with a remote control is set up to detect certain infrared signals. You need to program the VCR's remote control to send signals that your TV will recognize and respond to. Here's what to do:

Programming the Remote Control

- Turn the television on (any channel is okay).
- Aim the VCR's remote control at your TV set. Hold down the TV button (*not* the TV/VCR button) while you press the number corresponding to your brand of television as shown in the chart (page 37).

For example, if you have an RCA television, press TV and 0 at the same time. If this button combination sends a signal that matches with your TV, the channel will change on the TV, and you'll know the remote is set to control the television.

- If that button combination does not change the TV channel, go through the whole list of button combinations one by one until you find one that does change your TV channel.

Also, if your brand of TV is not listed in the chart, try all the number buttons. One of them may work for you.

• Hooking Up to a Cable Box

The cable box brings all the advantages of pay cable, but finding a satisfactory hookup can be challenging. To sort out what to do, we suggest a step-by-step approach to installation.

You will need RF TV splitters, coaxial cable jumpers, and possible RF switches to try various configurations. These are not furnished with your VCR because each installation will have different needs and require different cable lengths.

Before you begin, take a close look at the back of your TV to see where cables are currently connected. You may need to reconnect them that way later. As an aid to memory, use masking tape to label each cable and connection.

A Step-by-Step Approach

Try the hookups listed in Options 1 through 4. They are based on whether the cable channels signals are scrambled, unscrambled, or combination. (Your cable company can tell you more about this.)

After each hookup, power up the VCR and the TV. Use the Setup screen (page 19) to select option CATV1 or CATV2. Then check out the system using these questions as a guide.

- Does the TV receive the same number of channels as before the installation?
- Does the VCR record all channels?
- Do the VCR and TV remote control functions work?
- Can I record on one channel while watching another?
- Do I receive my pay channels, and do all special cable features work?

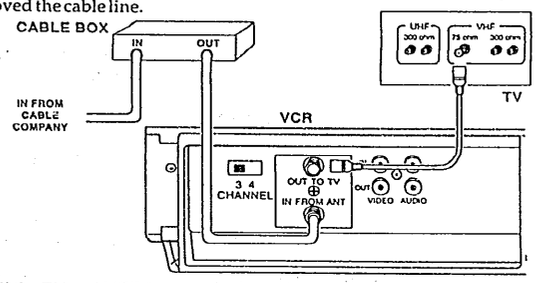
If any function does not work, or works in an unexpected way, hook up everything the way it was when you started and begin again with the next hookup option.

If you don't have a direct video connection—the one using the audio/video cable—make sure the TV channel is set to 3 or 4 when you play back a tape.

Consult the cable company or the cable converter manual for assistance in using the VCR with a cable converter. You will probably need to set the VCR to channel 3 or 4 and then use the cable converter to switch stations. There may be additional procedures for picking up pay-for-view or scrambled channels, which the cable company will gladly help you with.

Option 1—All Channels Scrambled

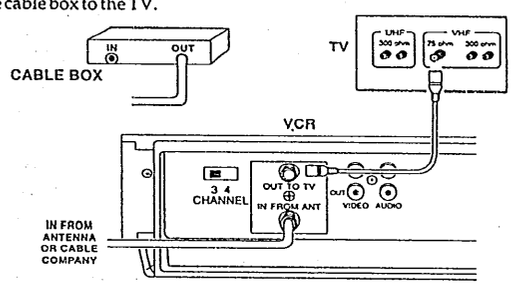
1. Remove the cable company's cable line from the back of your TV. Connect it to the IN FRONT ANT lower jack on the back of the VCR.
2. Using the 75 ohm coaxial cable supplied with your VCR, connect either end to the VCR's OUT TO TV upper jack
3. Connect the other end of the 75 ohm cable to the TV, in the same place where you removed the cable line.



Check all the TV and VCR functions. If you don't get all the functions you want, proceed with Option 2.

Option 2—All Channels Unscrambled

1. Remove the cable company's cable line from the back of the cable box that goes to your TV. Connect it to the IN FRONT ANT lower jack on the back of the VCR.
2. Using the 75 ohm coaxial cable supplied with your VCR, connect either end to the VCR's OUT TO TV upper jack.
3. Connect the other end of the 75 ohm cable to the TV, in the same place where you removed the cable line. *Note:* You will end up with an extra cable that originally went from the cable box to the TV.

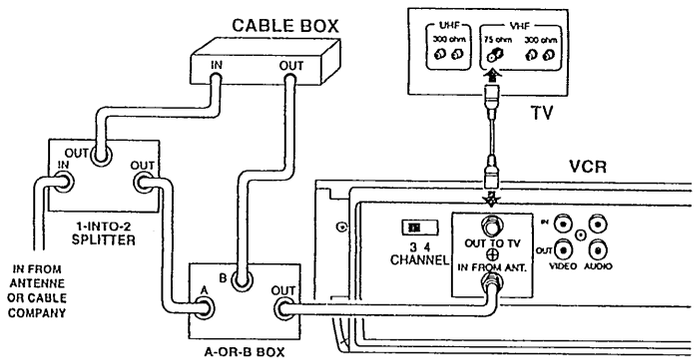


Check all the TV and VCR functions. If you don't get all the functions you want, proceed with Option 3.

Option 3—Some Channels Scrambled

This hookup requires three coaxial jumpers with connectors, a 1-into-2 splitter, and an A-or-B switch box.

1. Disconnect the cable from the cable box and attach it to the input line of the 1-into-2 splitter.
2. Using a coaxial jumper, reconnect one of the splitter outputs to the cable box's input that you just freed up.
3. Using a second coaxial jumper, connect the other splitter output to the A of the A-or-B switch.
4. Using the cable box output line, connect the cable box receptacle to the B of the A-or-B switch.
5. Using a third coaxial jumper, connect the output of the A-or-B switch to the IN FROM ANT lower jack on the back of the VCR.
6. Take the coaxial cable that is still connected to the television and hook it to the VCR's OUT TO TV upper jack.



This setup lets you switch between the two configurations in Options 1 and 2. Check all the TV and VCR functions. If you still don't get the functions you want, proceed with Option 4.

Option 4

If none of the preceding hookups work, check with your cable company. You may need to purchase a video switching system from your local electronics or video retailer. This will easily handle most hookup problems.

Remote Control of the Cable Converter

If you have a cable converter, you will probably want to program your VCR's remote control so you can easily change channels. The process is the same as for programming the remote to operate your TV. For additional details, see page 36.

- Hold down the CATV button and press the number of your brand of cable box (shown in the chart).

If that button combination does not work, or if your brand is not on the chart, just go through all the button combinations until you find that one that works best.

Cable Converters	Press CATV and This Number
Jerrold 1	1
Jerrold 2	2
Jerrold 3	3
Hamlin	4
Zenith	5
Scientific Atlanta	6
Pioneer	7
Philips	8

To operate the cable box once the remote is programmed for it:

- Press CATV and then the button of the function you want.
- Press VCR1 to operate your VCR with the remote again.

Often Encountered Problems

Problem	Things to Check	Solution
No power.	Power cord plugged in?	Connect the power cord to AC outlet.
Delayed recording does not work.	Program set to the correct channel?	Reset the delayed recording.
	Program time and date set correctly?	Reset the delayed recording.
	VCR power turned off?	Turn power off to activate the timer.
	Safety tab removed from the videocassette?	Put cellophane tape over the tab area, or use a videocassette with the safety tab intact.
Does not record when you press REC.	Safety tab removed from the videocassette?	Put cellophane tape over the tab area, or use a videocassette with the safety tab intact.
TV program cannot be viewed or recorded.	Loose or inappropriate connections between VCR and TV?	Review hookup directions and make correct, firm connections.
Poor picture quality ("noise") during playback.	TV channel selector on the proper channel?	Set TV to channel 3 or 4 as correct for your area. (Set TV to AUX or VIDEO if you have a direct video hookup.)
	Is TV correctly tuned?	Fine tune the TV.
	Static lines through the picture?	Press the tracking control buttons to adjust tracking.
	"Noisy" picture despite all previous adjustments, even when playing different cassettes?	Have video heads cleaned by a qualified service technician.
No picture during playback.	TV set on the correct video viewing channel?	Set TV to channel 3 or 4.
TV cannot be operated by the VCR's remote control.	Is VCR remote control programmed for your TV?	Follow instructions in Advanced Operations to program the remote to send signals that your TV can recognize. (Not all TV brands are compatible.)
	Is remote control set to control the TV?	Press the TV device button, then press the button corresponding to the TV function you want.
Mechanical sounds during the STOP mode.	Has a loaded cassette been stopped more than 5 minutes?	Nothing is wrong. The tape protection mechanism is working. Eject the cassette if you are done viewing. Otherwise, no action is necessary.

HITACHI

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